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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street New York

VOLUME XIII NUMBER FOUR

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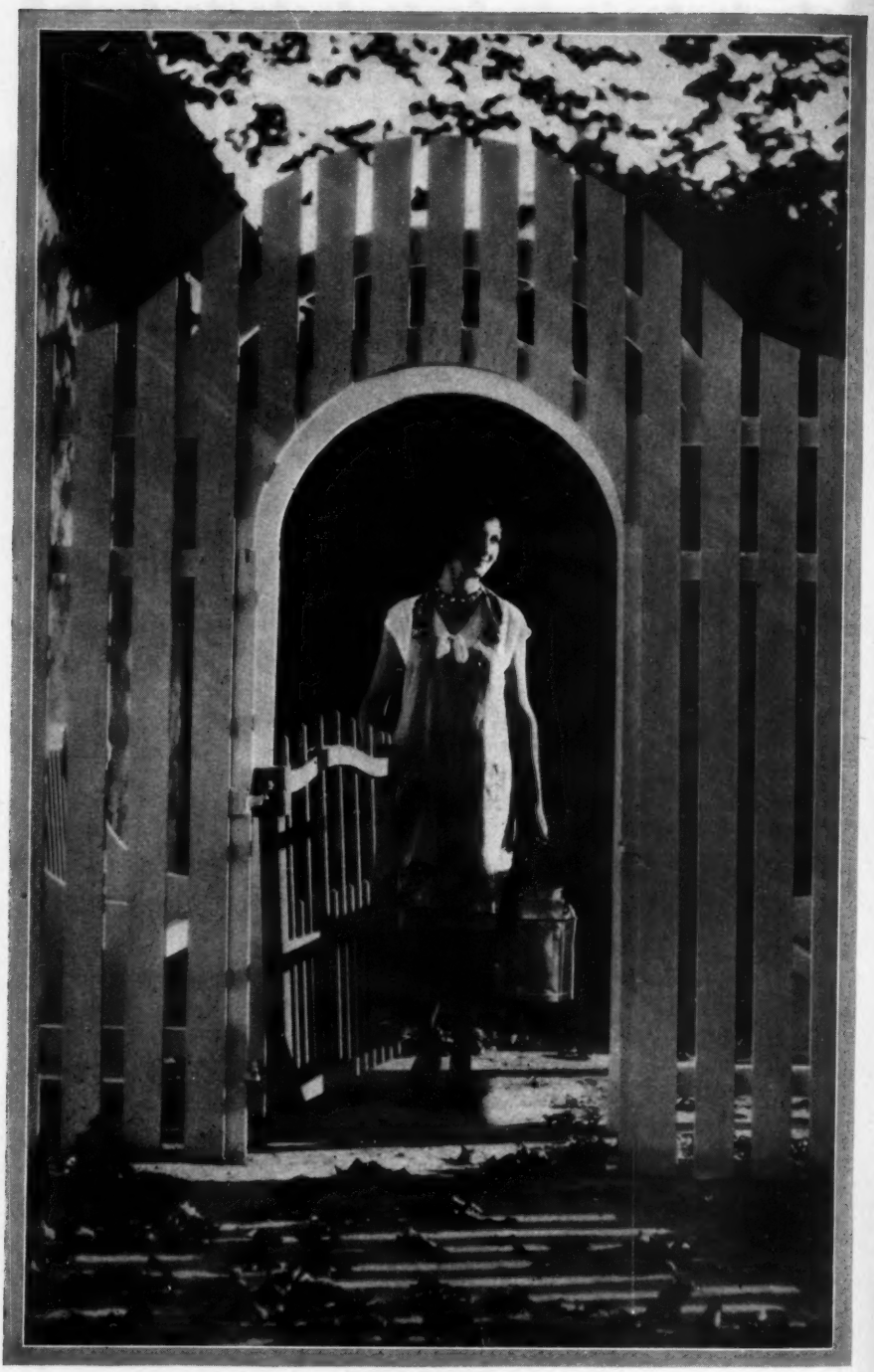

On an October Day

Better Crops with PLANT FOOD

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VOL. XIII NEW YORK, OCTOBER, 1929 No. 4

It begins when you toddle and ends when you totter—

Education

By Jeff McDermid

EDUCATION resembles religion in a few respects. Everyone is supposed to have some, everyone is presumed to benefit by it, but the trouble comes, as with Uncle Zeb's porous plasters, in making the darn things "stick tight and draw like thunder."

If we accept as historic truth that the American Indian was the first victim of the white man's conquest in this hemisphere, so must we acknowledge that our vanishing red brothers were the original recipients of the white man's campaigns for education and religion on this continent. True, the aborigine had established certain schools and cults of his own prior to the invasion of eastern culture, but in order to be "finished" in modern style the savage had to accept our spellers and prayer books. That the degree of finish, almost amounting to polish, which the innocent Indians acquired as a result of our educational process has never been challenged (except in the Congo) is merely a review of history. In any event we are consoled by the reasonable belief that it is a demonstration of the "survival of the fittest" race. That is, the red brother was not able to withstand so much erudite punishment and still survive. It's pretty stiff to make a nature wanderer swallow the dictionary and the catechism all in one short generation.

As I scan the bibliography of education and see how many different

ideas there are as to what education is or ought to be, I am of the opinion that the vanished tribesmen are happier in their free hunting grounds than some of us are in our academies. They have at least passed the danger zone of being made objects of experiment.

On the other hand I am not so sure but that King Phillip, Rain-in-the-Face, Sitting Bull, and Geronimo might not thoroughly enjoy the radical tendencies seen in many of the wild-eyed centers of pedagogical theorizing. Indeed the cafeteria style of education and the free-lance system of learning would have many things in common with the scalp dance and the fiery ordeal. Furthermore, it would at once relieve the student of all concern as to personal appearances and niceties of deportment. Neither would he have to bother overmuch with spiritual strictures. He would delight in seeing that modern experimental education is more concerned with *mores* than *morals*. I am almost sorry that some of our dons and deans were not on the job back in the bush days in place of Jonathan Edwards and Roger Williams. But it's too late for a trade!

SOME of my friends aver that the greatest portion of the nation's wealth is equally divided between gas stations, beauty parlors, speakeasies, and schools. In my state, for illustration, they have a legislature that leaves questions of gas taxes and education to the last thing. Whether this proves it one way or the other I do not know. But the faculty of the University, which had run out of gas, were obliged to spend their vacations on the front porch until the budget crossed the goal line. I understand that in a neighboring state the educational finances are securely out of the trenches before Christmas, which is an ideal we should strive for in our good old commonwealth. Maybe if we arranged to hold our classes in a stadium and appointed skillful cheer leaders to root for research, the alumni would elect better senators for us.

I have no quarrel with the percentage of taxes and earning power spent on good roads and good schools, for they help us to get somewhere, with less wear and tear. But it is getting so evident that neither local scenery nor local learning is enough to suit the growing generation. Through roads and through education are what they squawk for nowadays. When an old friend of mine introduced a bill in the assembly to promote more advanced courses in district schools, the state supervisors sat down on him. No, it isn't stylish to stay at home and get smart nowadays. You have to travel far and get cultured or own a radio and be common.

EDUCATORS and other watchful people have as hard a time keeping propaganda out of the curriculum as they do trying to keep hooch out of Chicago. I doubt if a constitutional amendment would suffice either. This propaganda comes in so many disguised forms that we need a Sherlock Holmes to serve on our school boards and regent committees. Pretty demonstrators invade the domestic science classes with cook-books and tasty menus in which somebody's culinary product or new fangled stove is featured. Association and bureau lecturers ask for 10 minutes at assembly hour to put across their favorite theme. Essay writing contests in which the dumbest usually wins the laurel are fostered and foisted on the teaching staff under the guise of patriotism or pyorrhea. Vexing prize trips and other distracting doctrines are held up as bait to inveigle the youthful mind. Even the sage professors who help write our text-books on a meager salary and a small royalty are exposed to bribes in the interest of private propaganda.

It is indeed fortunate that our chil-

(*Turn to page* 60)

This photograph, taken from an aeroplane at an elevation of 800 feet, shows the letters written on the alfalfa with "ink" consisting of an application of muriate of potash at the rate of 200 pounds per acre.

The Keystone Farm

By Irvin J. Mathews

Winamac, Indiana

WHEN more than 1,200 progressive farmers and representatives of state experiment stations, the agricultural press, and the fertilizer industry spend a full day in studying the agricultural practices of one farm, that farm indeed might be considered a keystone farm. This is what happened on August 8, 1929, at the Field Day held on the Pennsylvania Railroad Company's Demonstration Farm, near Howard City, Michigan, where the "Keystone" method of farming sandy soils came into full prominence and won the interest and praise of those in attendance.

The meeting held this year was the second annual sandy land farmers' field day to be held on this farm. Many features had been prepared for the day, and the large crowds in attendance were not disappointed, many of them still being piloted about at sunset.

The Pennsylvania Railroad bought this farm-sized tract of Plainfield sand in southern Michigan in 1916. Here it was proposed to demonstrate, if possible, that these sandy soils, of which Michigan has some 9,000,000 acres and through miles and miles of which the roadbed passes, could be managed profitably. The late D. L. Hagerman, at that time agricultural agent for the railroad, decided that the best way to treat the proposition was to consider the whole farm as a unit for demonstration and to operate it permanently on that basis rather than on the small plot basis. Accordingly the Keystone rotation was originated and since has been demonstrated by his brother, B. O. Hagerman, and the resident farm manager, Gerritt Posthumus. That it has been a success is evidenced in the remarks of J. F. Cox, Dean of Agriculture of the Michigan State College.

"The hazards of frost, drought, and wind are very great here," said Dean Cox, at the recent field day, "but you have shown beyond question that by following the Keystone rotation you recommend, this sandy soil will give a good account of itself."

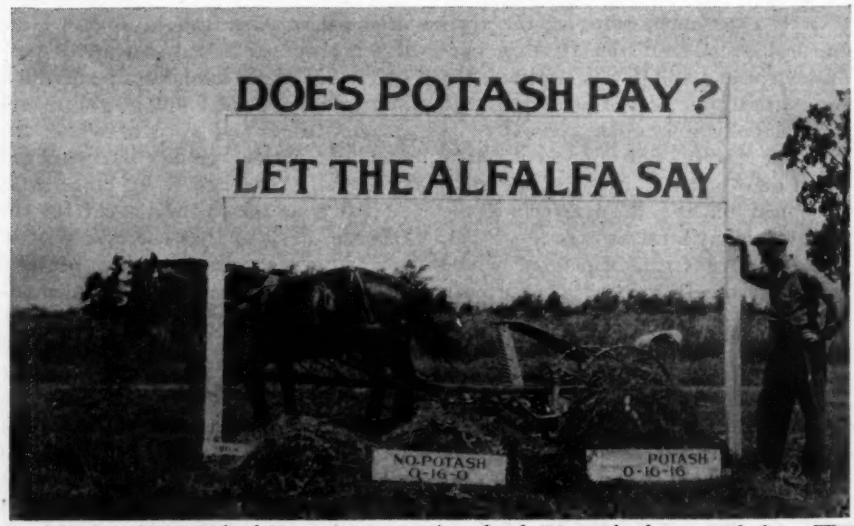
The Keystone rotation is a four-year cropping program, evolved particularly for porous, sandy soils because of the need for conserving soil moisture and maintaining fertility through the addition of humus in green manures and cover crops to supplement barnyard manure. At the outset, the plan was to start in a modest way, as a farmer would do, and through gradual improvement develop a productive farm. Guernsey cattle were chosen as a means for turning legume roughage into cash and fertility, the start being made with a purebred Guernsey bull calf, a three-teated 13-year-old purebred Guernsey cow, and two grade heifers, at a cost of $395.

Practically all of the farm was marled, using four to five cubic yards per acre, preparatory to growing the legumes. The rotation called for peas and oats seeded to sweet clover; sweet clover for hay or seed or pasture, seeded to rye and vetch; rye and vetch seeded again to rye and vetch; then a cultivated crop, such as corn, potatoes, or beans, and the land again seeded to a legume crop such as alfalfa. The rotation calls for at least one legume on all of the land each year, a cover crop during the winter, the return of the greatest possible amount of organic matter, and carries with it the recommendation of the generous use of manure and commercial fertilizers.

The Use of Fertilizer

Regarding the use of commercial fertilizers, Mr. Hagerman has said, "We make no apology in recommending the consistent use of commercial fertilizer. The majority of sandy land has been cropped until it contains little or no humus. Its mineral elements have leached out until there remains little else of the soil than finely pulverized rock.

"The commercial fertilizers provide an economical and successful means of returning these missing elements and thereby establishing successful stands of legume or grass crops. The investment per acre in the application of



Superphosphate (525 pounds of 16 per cent per acre) produced 676 pounds of very weedy hay. When potash was added to the mixture, the acre yield went to 1,864 pounds of high quality weedless alfalfa hay.

commercial fertilizer is small and the immediate returns invariably pay back the initial cost and net above 100 per cent profit over a four-year rotation."

During the last three years, commercial fertilizers high in potash have been applied and the results carefully watched. That potash will pay on these sandy soils was uniquely demonstrated in a feature of the field day held on August 8, when from an aeroplane hovering over the crowd, air messages floated down to call attention to a potash demonstration in the alfalfa field. This demonstration consisted of the letters "POTASH PAYS" plainly written by alfalfa plants which stood out from the rest of the plants because of greater growth and a darker green color.

Mr. B. O. Hagerman (center) conferring with Dean J. F. Cox (left) while Professor G. M. Grantham of Michigan State College is giving a talk, at the Keystone Field Day.

The alfalfa was sown in a regular Keystone rotation seeding of peas and oats on May 11, 1928. The young alfalfa plants showed signs of potash-hunger, so on September 7, 1928, the letters POTASH PAYS were laid out and sketched in. They were 75 feet across from top to bottom, and a one-horse five-disc wheat drill was used to go over the outlines of the letters, putting on muriate of potash at the rate of 200 pounds per acre. On July 9, of this year, when the first cutting of hay was made, these letters had growing on them about 2½ times as much hay as the untreated areas alongside.

In following Mr. Hagerman around the farm, the visitors were told when they came to a field of young sweet clover half way to their knees and dotted with shocks of oats which were thick and long, "On these oats we used 225 pounds of 2-8-16 fertilizer, a good percentage of potash to stiffen the straw and for sweet clover following." (These oats later threshed better than 40 bushels per acre.)

Next came a field of second growth sweet clover which was knee-high. "We got 2.3 tons of sweet clover hay off this field the first cutting. The growth you see here will be turned over and sowed to vetch and rye this fall. This field shows how the Keystone rotation increases fertility. It produced 24.72 bushels of corn in 1923, and the next corn in the rota-

(*Turn to page* 54)

The buildings on the Highmoor Farm of the Maine Agricultural Experiment Station are typical of New England.

MAINE

Agricultural Experiment Station

By Charles E. Crossland

Alumni Secretary, University of Maine

DEMAND for fertilizer control was the real force which brought the Maine Agricultural Experiment Station into existence by act of the state legislature in March, 1885. It was the fourteenth station to be established in the United States. With no building or equipment and an appropriation of only $5,000 for salaries and expenses, the station actually began operation in April, the staff consisting of three men.

Up to 1885, the College of Agriculture which was established in 1868 had been doing some research, as a means of securing information to use in the classroom. With the opening of an experiment station, resident teaching and research were separated, a plan which is still followed today. The station is a department of the University of Maine.

At first all station research was done at the University then known as the Maine State College of Agriculture and Mechanic Arts. The field experiments were conducted near the station building and livestock research was done by using the college animals. Gradually the two have been entirely separated. The station now does no crop work on the campus, other than that performed in the small greenhouses attached to Holmes Hall. The poultry plant is separate from the college plant and cattle investigations

are conducted at one of the two experimental farms controlled by the station.

Not until 1888, following the passage of the Hatch act by Congress the preceding year, did the station have a home. A comparatively small structure was erected in 1888 to which additions were made in 1890 and 1904. The building is known as Holmes Hall, named in honor of the founder and first secretary of the State Board of Agriculture who was very active in the establishment of the college.

In 1909 the station acquired what is now known as Highmoor Farm located in central Maine. It consisted originally of 225 acres, but 30 acres adjoining recently have been purchased. There are on this farm about 3,000 apple trees, and most of the acreage is tillable. It is used chiefly for experimental work in crops, orchard, and livestock.

In 1913 Aroostook Farm in Aroostook county was purchased for the special purpose of research in potatoes.

About one-half of the 275 acres on the farm is tillable. The potato industry had grown to such proportions that extensive research was necessary; furthermore, results of experiments in central Maine did not always work out in Aroostook county, because soil and climate conditions were so different.

The passage of the Purnell bill made possible the establishment of agricultural economics and home economics departments.

Today the income of the station is approximately $140,000 annually, and the staff consists of 26 administration and research employees working on about 50 different projects.

Probably the Maine station is best known for the lead it took in poultry research, food digestibility investigations, studies upon economic aphids by Dr. Edith M. Patch, work in genetics as done by Dr. Raymond Pearl and others, potato disease research under direction of Dr. Warner J. Morse and Dr. Donald Folsom, and more recently by the work of Dr. John W. Gowen on the mode of inheritance of milk and butterfat production in dairy cattle.

During the 44 years the station has been operating, there have been but three directors, which doubtless accounts in considerable measure for the continuity of studies along certain lines and the close adherence for the most part to the strict idea of research.

Dr. Whitman H. Jordan, a graduate of the University of Maine in 1875, was the first director, beginning July 1, 1885, al-

Left: That more experimental work has been done on potatoes than on any other crop is evidenced in the number and size of these plots.

Below: All phases of potato raising have been or are being studied. The proper ratio of the plant food elements and most profitable amounts of application are important problems.

Dr. Whitman H. Jordan, First Director.

though appointed three months earlier. During his 11 years incumbency, Dr. Jordan gained a wide reputation for his successful administration as well as for his own research in digestibility studies as a result of which he became director of the New York Station on July 1, 1896, which position he held for 25 years until his retirement. Dr. Jordan became known as the dean of station directors by virtue of having served the longest in that capacity. Although retired and residing in Orono, he still retains very active interest in research.

Dr. Charles D. Woods, Second Director.

Following Dr. Jordan came Dr. Charles D. Woods, who had for a time been associated with the former in Connecticut. He too was an outstanding chemist. He served within a few months of 25 years. The present director, Dr. Warner J. Morse, took the helm in April, 1921. He had, however, been connected with the Maine Station for about 15 years, having started the plant pathology department in 1906 when he was first appointed. His work on potato diseases had won for him an outstanding place as a plant pathologist.

Dr. James M. Bartlett should also be mentioned at this time because of his unusual record. Probably there are few, if any, who can claim the distinction of still being in the service of the station since its organization. Dr. Bartlett was appointed assistant chemist upon the establishment of the Maine Station in 1885 and is still a member of the staff, being chief chemist. He has also served as acting director.

During the early days analyses of fertilizers, and later also of feed and foods, were of first importance, but in 1914 the state relieved the station of its police duties. It now does

Dr. Warner J. Morse, Third and Present Director.

Test plots on Aroostook Farm—clover in the foreground, grain in the center, potatoes in the background.

only the analytical work involved.

Dr. Jordan pioneered in the field of digestibility studies. Increased production of potatoes and grains as well as milk were emphasized. Establishment of fundamentals of the dairy business, too, was undertaken, perhaps the most important of which was the introduction into Maine of the Babcock test as a means of selling butterfat rather than measuring the cream by inches. Then, too, the station for many years endeavored to carry information to the farmer, to help him make practical use of the results of experimentation. This was done largely by participation in Farmers Institutes. These contacts strengthened the position of the station which in turn made stronger the position of the College of Agriculture with the rural people.

Concentrated Research

One experiment, perhaps the very first involving human beings ever conducted, was carried out by the Maine Station. As a result of the study involving all the men then in the dormitory, it was shown that milk satisfactorily did replace so-called dry food.

In recent years research has been concentrated more or less so that several projects are proceeding simultaneously on different phases of the same subject. Typical illustrations of this is the work which has been and is being done on potatoes, orcharding, and blueberry growing.

More experimental work has been done on potatoes than upon any other crop. Practically all phases of potato raising have been or are being studied. The results of the work of the Maine Station on diseases is widely known. Control of late blight was the first outstanding achievement. This has been followed by a long series of projects dealing with the isolation and control of potato diseases and their effect upon yield. The determination that the aphid was the carrier of mosaic and other virus diseases was a discovery of national importance. The Maine Station was one of the first to work on potato scab.

Bulletin 350 just published contains the results of experiments involving the use of concentrated fertilizers for raising potatoes. This is thought to be the first publication issued on this subject giving the results of extensive field data. Because of the geographical location of Aroostook county, the economical factor of reduced expense from transportation alone is important. In general uniformly good re-

sults were obtained from double strength when compared with ordinary strength fertilizer, due perhaps in part at least to favorable type of soil and to ample, well-distributed rainfall. Application of most mixtures was made fairly well with the fertilizer attachment, though difficulty was experienced with such highly concentrated mixtures as 15-24-21.

Among the many other research projects completed in addition to those already mentioned are potato aphids, spraying and dusting, analysis of Maine-grown potatoes, method of applying fertilizer, effect of different forms of ammonia and of high and low ridge cultivation.

Current Projects

Projects on which work is now being done are—potato mosaic, potato diseases associated with or related to mosaic, potato spindle tuber, potato leaf-roll, net-necrosis, stem-end browning, and spindling-sprout. Others include fertilizer experiments with potatoes in rotation with grain and clover, effect of selection within a variety, rots of potato tubers and seed pieces, dusting and spraying, retentive powers of Aroostook soils for mineral nitrogen, effects of fertilizing materials upon the composition of the ash of vines and tubers, seed disinfection, comparisons of healthy potato strains, and commercial, tuber-line, and chemical work including hydrogen-ion determinations on the differences in potato plants and tubers due to certain degeneration diseases.

Many phases of orcharding, more especially apple raising, have been and are being stuided. All the work has been done at Highmoor Farm. Some of the work done in the past disclosed that pollination may influence size and shape but not the color of the fruit, the relationship between tree type and yield, control of certain diseases and insects, the value of a few pounds of nitrate, bud and root selection, and an economic study of the apple industry of Maine.

Somewhat as a continuation of the economic study is one on marketing apples now under way, involving first, the actual marketing of Maine fruit and consumer's preferences, and second, cull apples and their economic significance. Bud selection investigations are under way. Results thus far indicate that selection will apparently only maintain normal productivity of a variety. The study of relationship between shape and yield is being continued. Pollination studies, particularly of the New England Seven varieties, are being carried on. Further experiments on the use of fertilizers in orcharding are being conducted, as well as research on apple scab control, breeding new varieties, especially a later MacIntosh, variety tests of apples, plums, and small fruits under Maine conditions, and the relationship if any between size of tree when set, annual rate of growth, and subsequent yield. Preliminary data would seem to indicate that there is some correlation.

Work on Blueberries

Research into the many problems incident to raising blueberries in Maine, other than insect control, have only recently been started. Heretofore the propagation of this fruit has followed a natural course, but with a realization of the possibilities of what this crop might mean to the state, investigations attacking many phases of the industry are now under way.

An economic study is being made as a background to gain a knowledge of the industry in Maine. A study is being made to determine the soil and fertilizer requirements of the native blueberry. As a result of the first-year plot tests, field experiments are being established this season. Early results of selection and variety tests of low-bush berries indicate that there are some strains superior in yield and quality. Propagation methods, culture, and field management, as well as pollination and sterility studies, have been started. Entomological investigations of insects affecting blueberries have

Holmes Hall, headquarters of the Agricultural Experiment Station, on the University of Maine campus.

been under way for some time. Several distinctive insect pests of the blueberry have been studied and control measures established.

Although perhaps more work has been done on the subjects already discussed, they by no means include all the important nor even outstanding achievements of the Maine Station investigations.

As a result of several years of experimentation, the station produced the Maine 340 oat which after tests in practically all sections of the state has been found to be the best for Maine conditions. Extension Service reports of field demonstrations show consistently an average increased yield of 10 or more bushels per acre above the average of varieties commonly planted. This seed was first offered for sale in 1914 and has meant thousands of dollars to Maine agriculture each year.

Tests are being continued to determine the value of new varieties, not only of oats but of other grains. Supplementing variety tests are fertilizer experiments to determine the kinds and amounts of fertilizers needed under varying conditions. Extensive tests of silage corn varieties have been made to ascertain those best adapted to Maine's short growing season. Early maturity and yield have been studied, especially with some attention to fertilizer requirements.

Dr. James M. Bartlett, chemist, has been in the service of the Maine Station for 44 years.

According to the results published in 1926, the older methods

(*Turn to page* 50)

Extension Workers Attend First School

By Rensselaer N. Sill

Madison, Wisconsin

EXTENSION workers from 11 states came to the first summer school in America for county agents and home demonstration specialists held this year at the Wisconsin College of Agriculture, Madison. The school proved so popular and worth while that a similar extension course will be offered next year.

The course, which grew out of long agitation by county agents and their associations, was founded primarily with the purpose of helping extension specialists to render an even greater service to the cause of agriculture and the farm home. It was enthusiastically attended by men and women from widely separated sections of the country. They came from Arkansas, Wisconsin, Mississippi, Montana, Maryland, Colorado, Ohio, Missouri, and other states.

Two major courses of exceptional interest to members of the various state extension forces were offered to the students. One of these courses, listed in the catalog as Extension Methods, was under the direction of M. C. Wilson of the United States Department of Agriculture and his associates, C. B. Smith, G. E. Farrell, A. B. Graham, E. Merritt, H. W. Gilbertson, and R. A. Turner.

This course was based on the field studies of Mr. Wilson who has conducted extension research during the last five years in cooperation with the extension services of twenty states. In one of his studies, about 200 state extension workers participated, and information was obtained from farmers and farm women on 9,287 farms in 27 counties in 13 states.

The findings of this and other investigations were analyzed by those enrolled in the course in extension methods. They discussed in considerable detail ways of measuring extension progress, methods of collecting research data relative to extension, and the influence upon the effectiveness of extension teaching of such factors as the size of farms, land tenure, educational training, age, and contact with extension workers. In addition to these group discussions, an analysis of the means and agencies employed in extension work was made. Here, the students studied the effectiveness and cost of the result demonstration, the method demonstration, meetings, news stories, personal service, bulletins and other extension media. Attention was also devoted to such important problems as program determination, leader training, extension campaigns, and the educational principles underlying extension teaching.

Proves Inspiration

Other courses at the school of interest to county home demonstration agents dealt with special problems in extension, the methods and problems of agricultural journalism and advertising, public speaking, community recreation, marketing farm products, and farm relief programs.

"The entire summer school," as Robert Amundson, Wisconsin District Supervisor says, "was a revelation to most county and home demonstration

agents. It not only provided a means of getting the facts regarding the cost and relative effectiveness of various media used in extension work, but it also presented ways of improving the old standpat extention methods. To me, the course offered quite a little in the way of inspiration and introduced me to one of the most challenging and interesting fields in extension work, research."

The old method of conducting extension teaching is being supplanted by a new scientific method based on the facts uncovered through research.

At the summer school extension workers became thoroughly familiar with this research and discussed in detail its findings and applicability to practical conditions. What might prove a successful method in one state might prove a total failure in another. The method demonstration might be effective for teaching home economics and very costly for preaching the good gospel of efficient alfalfa culture. Just what methods are best for what crops and kinds of livestock? The answer was based on facts that would make possible the choosing of a method to accomplish the desired results with a minimum expenditure of time and money.

They found, for example, that of every 100 practices adopted, 93 could be credited to method and result demonstrations, g e n e r a l meetings, news stories, bulletins, farm and home visits, office calls, and indirect spread. The remaining seven practices were

STUDENTS IN THE FIRST SUMMER SCHOOL IN AMERICA FOR EXTENSION WORKERS

Bottom row, left to right: G. M. Henderson, Kansas; Mrs. Lillian Stille, Mississippi; Grace Freisinger, Washington, D. C.; M. C. Wilson, Washington, D. C.; J. A. James, Wisconsin; Iren Grouch, Illinois; P. B. Pancoast, Maryland.

2nd row: J. O. Hembre, Montana; Waldo Frasier, Arkansas; G. E. Annin, Wisconsin; J. M. Thomason, Arkansas; H. A. Pflughoeft, Minnesota; C. B. Drewry, Wisconsin; J. N. Kavanaugh, Wisconsin; J. B. Hayes, Wisconsin.

3rd row: R. A. Amundson, Wisconsin; C. C. Randall, Arkansas; B. E. Hart, Arkansas; H. M. Knipfel, Wisconsin; M. H. Alberts, Wisconsin; W. W. Clark, Wisconsin; I. H. Ley, Wisconsin; H. A. Graham, Oklahoma.

4th row: F. E. Henry, Wisconsin; F. T. Price, Wisconsin; E. H. Biddick, Wisconsin; I. R. Trumbower, Colorado; Cannon Hearne, Missouri; J. J. Lacey, Wisconsin.

traced to the influence of circular letters, exhibits, radio talks, correspondence, extension schools, leader-training meetings, telephone calls, posters, and study courses.

From the research of Mr. Wilson, the county agents also found that a unit of their time spent on the preparation of news stories and interviewing local editors influenced the adoption of three times as many practices as the same unit of time spent on farm and home visits, and 15 times as many practices as a unit of time devoted to extension exhibits.

Also a unit of time spent on farm and home visits was three-fourths as effective as the same time devoted to general meetings, and nearly twice as effective as a unit of time spent on result demonstrations.

However, this conclusion was reached only for total extension activities. There is a great variation in the effectiveness of the same methods when they are used for different practices. For example, the method demonstration is an excellent means of influencing people in regard to their clothing, health, sanitation, and, in general, the entire field of home economics, but if used for potatoes, corn, and wheat, it is very likely to be one of the least efficient methods.

In the case of such crops as corn, wheat, potatoes, alfalfa, soybeans, and cotton, the general meeting, the news story, the farm visit, and office calls will invariably give the best results. And for dairying, swine, and poultry, it was found that the general meeting and the farm visit are good extension methods. However, in the case of poultry alone, the method demonstration proved exceptionally effective. Tree fruits and vegetables are best promoted through a liberal use of the method demonstration, the general meeting, bulletins, and farm visits.

For soil improvement programs, the county agents concluded that no method is superior to farm visits, the next best is office calls, the next news stories, and the next general meetings.

Another, and a rather surprising finding, is that older farmers make the same response to extension methods as the younger ones. "Age," says Mr. Wilson, who is in charge of the school, "has been found to be absolutely no bar to education. This finding is in full accord with Dr. Thorndike's studies at Columbia University that were undertaken for the American Association for Adult Education."

"In practice", Wilson points out, "the worker should consider the methods to be employed for each new task. The time available, the adaptability of methods to a particular job, the possibility of reaching the desired number of people by means of certain methods, the necessity of establishing local proof and confidence, and the interrelationship of the methods selected are all points to be considered if the task is to be performed efficiently."

Advanced Course Planned

Obviously the course in extension methods was practical and well worth the time and study it demanded. Not only was the effectiveness of various methods for different farm and homemaking practices discussed, but the facts unearthed through recent research were considered thoughtfully. The course did not stop with a mere consideration of effective extension methods, but ways were worked out to make all methods even more effective. The advantages and disadvantages of each medium were listed, means suggested for the correction of their weak points, and the total experience of the group brought to bear on the subject.

In addition to the information secured from the courses at this first summer school of its kind in America, the members of the extension forces in attendance had the beautiful and long-famous campus of the University of Wisconsin to enjoy. There were picnics, boat rides, tours to noted beauty spots near Madison, and placid,

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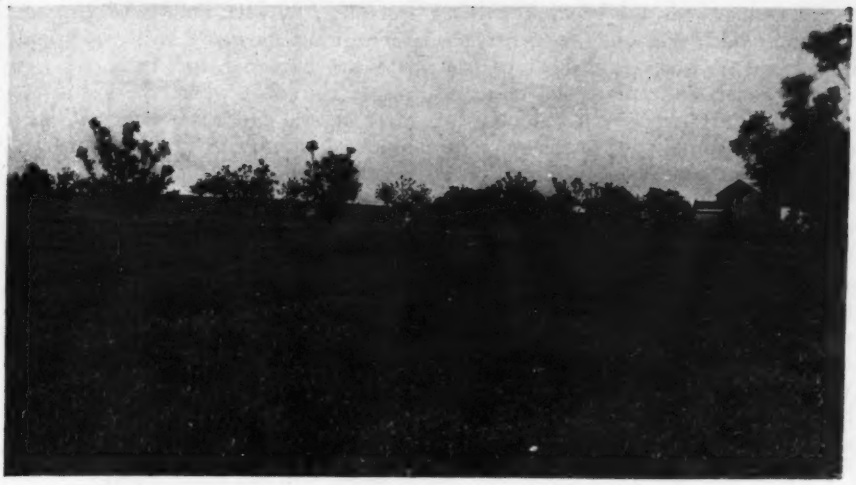

Hairy vetch and Austrian peas in a pecan grove—soil improvement demonstration on the farm of W. P. Bearden, Morgan county, Georgia.

Winter Legumes

By G. A. Hale

Assistant Agronomist, Georgia Experiment Station

THE practice of growing vetch or other winter legumes for green manure between corn or cotton crops is rapidly gaining favor with southern farmers. Summer legumes for hay and winter legumes for turning under are very desirable and profitable where intelligence is used in handling the crop. Trials prove that winter legumes can be made a very economical source of plant food for southern crops, but many farmers and agronomists seem to be blinded by the large yield increases and lose sight of fundamental principles of soil fertility which underly the practice of green manuring.

Legume enthusiasts claim that green manuring will greatly increase the organic and humus content of southern soils. Some go so far as to say that the organic matter in green manure crops is more valuable than the nitrogen in the plowed-under material. Carefully conducted experiments show that small amounts of green manure may actually reduce the organic content of fertile soils, as often more nitrogen is recovered in the following crops than was contained in the green manure. Very few long-time green manuring tests have been run in the South, but the results show no promise of increasing the humus content of soils where organisms are active throughout the entire year. Oftentimes small amounts of turned-under material will increase yields of following crops about as much as large amounts and these results indicate that something besides organic matter is responsible for good results with winter legumes.

Heavy clay soils will be sticky when wet and cloddy when dry regardless of how many winter legume crops are turned under, and only a soil chemist can detect any changes in soil texture or organic content of southern soils where green manuring is practiced. The main value of organic matter is no doubt as food for soil organisms which in turn store nitrogen from the air and unlock mineral plant foods from fertilizer residues and natural soil fertility. Next to putting the land in pasture or forest crops, the surest way to increase its organic content is by combining the wise use of commercial fertilizers with the best green manuring practices.

Nitrogen

Nitrogen production is the usual yardstick for measuring the value of a winter green manure crop since the total pounds of nitrogen turned under can be determined chemically much easier that the increase in yields of the following crops can be measured. Many soils men ignore the other plant foods of the legume crops and attribute all the benefits from the manure to its nitrogen content. Experiments show that large amounts of commercial nitrogen will not compensate for the increase in corn and cotton yields where winter crops are plowed under in the spring. Some workers are even estimating the value of the legume nitrogen at the current prices of commercial nitrogen while tests show the former to be only about one-half as valuable for fertilizer. Although an average winter legume crop will add at least 90 pounds of nitrogen per acre to the soil, there is no satisfactory evidence to show that a large part of this does not come from the soil supply. Lysimeter studies show that some nitrate may be lost by leaching and washing during the winter, but again no figures are available to indicate just how valuable winter legumes are as holders of plant food which would otherwise be lost by leaching. As with liming, turning under legumes on many soils may stimulate soil bacterial and fungus activities to the point where the soil is left, after several crops are removed, with much less nitrate than before the practice was started.

Phosphoric Acid

Unsuccessful attempts at winter legume growing demonstrate that liberal amounts of phosphates and possibly other fertilizers are essential for satisfactory growths of green manures. Unless excessive amounts of phosphates have been applied to the previous crops or the soil is naturally well supplied, legumes will not make enough growth to be profitable. Fortunately, cotton farmers have been using more phosphates than any other fertilizer in proportion to the needs of the crop, but this does not mean that the same amounts will suffice where green manuring is practiced.

A good winter cover crop will take from each acre of soil and make available to the following crop the equivalent amount of phosphoric acid contained in 100 pounds of superphosphate. It is clear that unless more superphosphate is used in the future this fertilizer will become more and more of a limiting factor in southern crop production. Tests indicate that cheaper sources of phosphates such as basic slag and rock phosphate can be used to advantage where legumes are included in the cropping system.

Potash

The important role of potash fertilizers in southern soils is being realized more and more as the idea of using potash in connection with nitrates for top-dressing cotton and corn is being demonstrated. Much work needs to be done on the value of potash in improving the quality of southern crops and its effect on disease control and other factors closely related to yield. Although the response to

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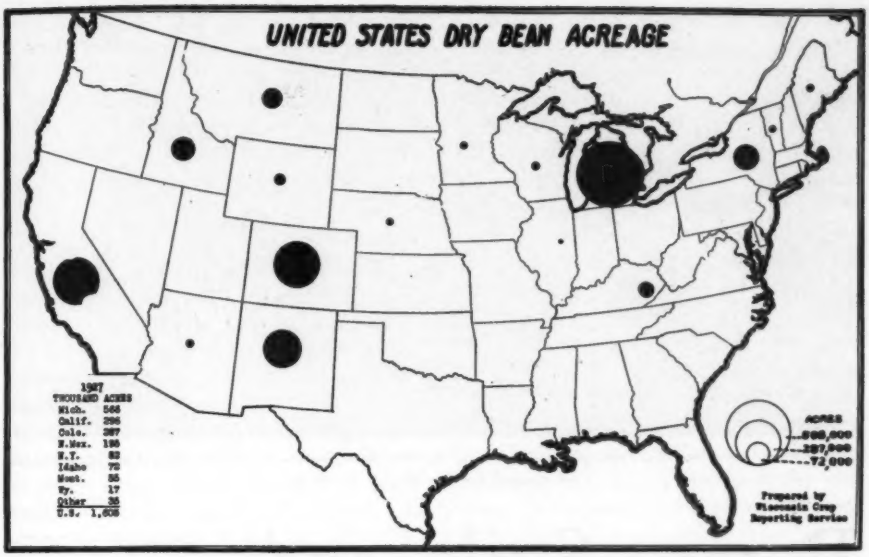


Dry Beans

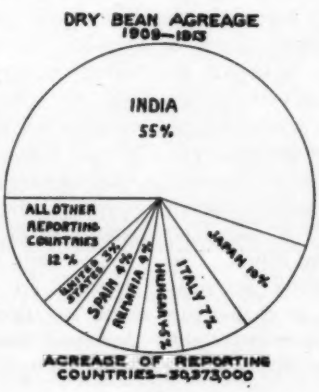
¶ *Eleventh in this series*

By Walter H. Ebling

Agricultural Statistician, Wisconsin

NO matter where one goes, the dry bean is almost sure to be available somewhere on the bill of fare. It is particularly well known in places where large numbers of men are together for operations requiring much physical labor such as construction camps, lumbering, mining, the army, and the navy. So well in fact has the bean been associated with the navy that many refer to our ordinary varieties of white beans as "navy beans."

The dieticians give the bean a high food value and rank it very favorably with other foods. It is strongly alkaline in character and starchy in nature. Its general use is probably attributable to its many desirable qualities as a food as well as to the fact that it is fairly easily preserved and transported under a wide variety of conditions.



In the United States, Michigan is the leading bean producer with about one-third of the national acreage. California ranks second, Colorado third, New Mexico fourth, and New York fifth in 1928. In general, the commercial dry beans are

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The potato vines on the left received a complete fertilizer, while those on the right received an unbalanced fertilizer. (U. S. D. A.)

Potato Soils *and Their* Fertilization

By B. E. Brown

Soil Fertility Investigations, Bureau of Chemistry and Soils, United States Department of Agriculture

(*Reprinted from the American Potato Journal, July,* 1929)

THE potato, while widely grown in the United States on many different kinds of soils, does better on certain types of soils than others.

If one were attempting to describe an ideal soil for potatoes, it would be about as follows: The soil should work easily and not get in poor physical condition after heavy rains; should be well supplied with organic matter or humus; and should be well drained but possess a good water-holding capacity, due to the presence of organic matter on the one hand and a proper proportion of the fine soil constituents, silt and clay, on the other. The soil should possess a good physical condition to some depth to enable the roots of the potato plants to enter the soil readily and allow for proper tuber development.

Well-drained, sandy, gravelly or shale loams, if well supplied with organic matter, generally are excellent soil types for potato production. A good crop of potatoes may be obtained on fairly heavy clay loam provided the drainage is all right and organic matter is incorporated with the soil by turning under a leguminous crop or sod with any available manure. Muck soils will produce very satisfactory crops of potatoes if adequately drained and well supplied with available plant food.

The soils to avoid for potato production are deep, sandy soils which tend to shift or blow, and heavy, poorly drained clays or clay loams with compact subsoils near the sur-

face. Soils which are very sandy will possess a low water-holding capacity and during a droughty spell a lack of soil moisture may prove very detrimental and result in too early maturity of the vines. Heavy, poorly drained clays and clay loams lacking in good tilth may be counted on generally to produce low yields of tubers of inferior shape and quality. Avoid such soils for potatoes until put in good condition.

The foregoing are rightly termed marginal soils. There is entirely too much wasted effort on the part of some in trying to produce potatoes on them when it would be much wiser to grow crops better adapted to such soils. In the aggregate there are enough potatoes grown on such land to seriously compete with the product of good natural potato soils, thereby contributing to some of the surplus potato crops of recent years.

Good soil preparation for the potato crop is indispensable to good yields; just as much so as good seed, spraying, and cultural care are essential. When and how to prepare land, what kind of rotation to practice, and other equally important matters, varying from one section to another, will need careful consideration before deciding what and how much fertilizer to use.

This plant, grown on a soil deficient in potash although abundantly fertilized with nitrogen and phosphorus, is stunted; the leaves are crinkled; and the petioles shortened. The leaves, deep green at first, later become bronze in color. The entire plant may collapse. (U. S. D. A.)

A healthy plant with strong, sturdy, upright stems, and smooth, even-colored leaves results when potatoes are fertilized with a complete fertilizer containing nitrogen, phosphorus, and potash. This is the type of plant that pays the farmer a good margin of profit. (U.S.D.A.)

As nitrogen, phosphoric acid, and potash are the plant-food elements which generally are most likely to be deficient in the soil in an available form, brief reference will be made to their functions in plant growth and development. It will be understood that each of these elements plays a specific part in plant growth and that the functions of one element cannot be substituted for those of another.

It should also be considered that a thrifty vine development is of paramount importance, for good vine growth is what insures starch formation and tuber development. One after all applies fertilizer primarily to influence leaf and stem growth; the tuber development follows. If the plants are fed in the beginning with plenty of available plant food the chances are, unless seasonal conditions are very unfavorable, that tuber development and resulting yield will be more certainly assured than in the case of underfed plants possessing comparatively limited leaf areas. Such plants are better able to produce starch than under-nourished potato vines.

The presence in the soil of plenty of available nitrogen is especially important in giving the crop a quick start with a corresponding stimulation of the growth of the

The result of applying proper and improper fertilizers—reading left to right: (1) No fertilizer; (2) P_2O_5 and K_2O, without NH_3; (3) NH_3 and P_2O_5, without K_2O; (4) Complete fertilizer. (U.S.D.A.)

leaves and stems. There results a more rapid, larger growth of vines possessing a healthy appearance and normal color.

A deficiency of available nitrogen is evidenced by the vines turning a lighter green than normal. In some cases a yellow shade will develop, giving the plant a distinctly abnormal appearance. As a result, the plants fail to grow as well as they should, and if the lack of nitrogen is long-continued, the plants will remain stunted. As starch formation is more or less proportional to leaf development, a lack of nitrogen may materially lower the yield. In case of a lack of available nitrogen, no amount of available phosphoric acid and potash will overcome this deficiency. As previously stated, one plant food cannot be substituted for another as each has its specific functions in the growth and development of crops.

An excess of available nitrogen encourages late maturity and is apt to render the vines more susceptible to attacks of disease organisms. Too much nitrogen may result in tubers of inferior cooking and keeping quality.

For crops in general phosphoric acid is helpful in promoting root development in the early stages and seed or

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Showing how potash increased the yield on a Miami fine sandy loam in Wisconsin.

Future Farmers

By M. D. Mobley

Assistant State Supervisor for Agricultural Education, Athens, Georgia

BEGINNING about five years ago in Virginia, the Future Farmer organization, composed of vocational agricultural pupils, has spread from state to state and has grown until at present there are more than 50,000 members. The national organization known as the F. F. A.—Future Farmers of America—was formed last fall when delegates from 19 states gathered at Kansas City, Missouri. The delegates that met represented the various state organizations.

Credit for starting the Future Farmer chapters in America is due Henry Grosclose of Virginia. For some time Mr. Grosclose had thought of the farm problems of the nation and had wondered why farming did not seem to hold the appeal for boys that it did when Washington was farming at Mount Vernon and Thomas Jefferson at Montecello. While thinking of these and other illustrious sons of the Old Dominion, who belonged to the first families of Virginia, Mr. Grosclose thought of the F. F. V. — Future Farmers of Virginia. While in a hospital in Baltimore, Mr. Grosclose worked out the constitution of the organization and framed the initiation ceremony for the first degree.

The idea proved very popular among boys, and it was only a very short time until a local chapter was formed in every school in Virginia where agriculture was taught. It was from this beginning that today there are Future Farmer Organizations in more than half the states of the nation, with a membership of more than 50,000 boys.

The purposes of the national organization as set forth in the constitution are: To nurture a love for country life; to promote thrift; to encourage recreational and educational activities; to create more interest in the intelligent choice of farming occupations; to study farm problems; to encourage cooperative effort; to render unselfish service to rural communities; to develop rural leadership; to strengthen the confidence of the farm boy in himself and his work; and to improve farm practices through the application of scientific methods. It is encouraging to follow the work of the organization and to see that the purposes are being accomplished.

The Degrees

There are four grades of membership in the organization, namely: Green Hands, Future Farmers, State Farmers, and American Farmers. Each degree is attained upon accomplishment in farming and leadership ability. Ceremonies for raising members to the various degrees have been worked out. The boys take great interest in initiating new members.

The organization from the local chapters to the National Congress at Kansas City is in the hands of the boys. Officers are elected annually, from among the active members, who are composed of vocational agricultural pupils only. While teachers and state officials may advise with the boys, they have no vote on questions that come up.

It is really surprising to see the interest the farm boys are taking in this new organization. When I first heard of it, I thought that it would be popu-

lar with only the leaders of vocational agricultural work, but I have found that it really carries an appeal for boys.

As advisor for the Future Farmers of Georgia, I have been thrown in very close touch with members of the organization in this state during the past year. After a close study of the interest taken by the members, and observing their desire to carry out the purposes of the organization, I am convinced that the Future Farmers of America within a very few years is destined to be an important factor in the nation's agricultural situation.

Influence Is Wide

Recently the following letter, which strikingly points out the influence a Future Farmer Chapter has on the attitude of the members toward the school and community and tells briefly some of the things being carried on, was received from H. A. Jones, Supt., of the Sale City High School, Sale City, Georgia:

"I feel that I should write you concerning the Sale City Chapter of the Future Farmers of Georgia.

"I will enumerate a few of the things that it has meant to the boys, the school, and the community. They are as follows: it has helped the members to speak before an assembly; it has taught them the value of cooperation not only in their school work but in everyday life; it has caused them to enter into the school spirit better than ever before and to get behind any school movement and see it to a successful finish; it has helped them to enter into their farming operations with more confidence.

"The chapter has helped our school in all worthy activities, and we have felt its influence in every community undertaking.

"I recently attended one of their meetings, and I have never seen older men carry out a program with more order and seriousness than these boys. I have only enumerated some of their achievements and will not attempt to mention all. Suffice it to say that we are proud of our Future Farmer Chapter and that we consider it one of the community's greatest assets."

(Signed) H. A. JONES,
Supt. Sale City High School.

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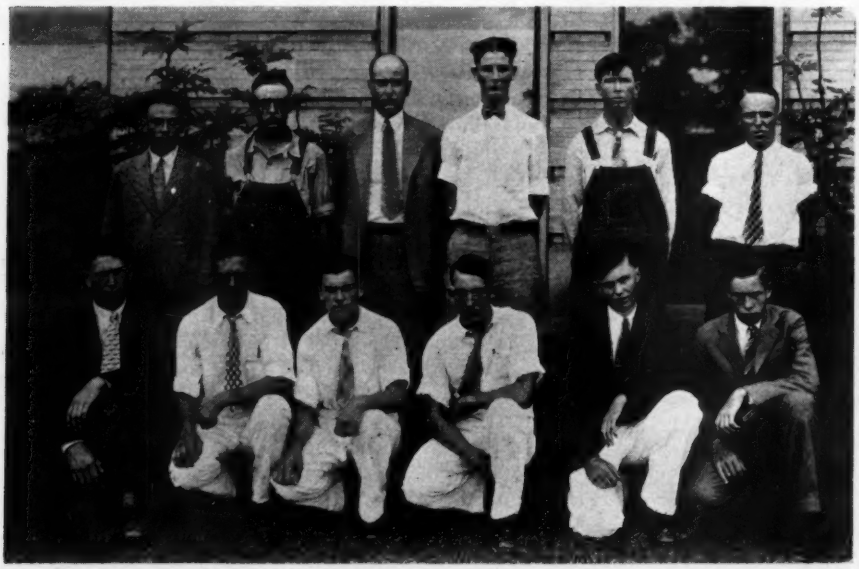

These young men are the first to be honored as Georgia Planter members of the Future Farmers of Georgia. The boys have saved a total of $5,206.06 from their farming operations, and have been outstanding in many other school and community activities. They hail from 10 communities.

John F. Rode of Swedesboro, N. J., insures the production of "chunks" by applying potash in the fall.

The Fall Application *of* Potash *for* "Sweets"

By R. H. Stinchfield

IN one of the most prosperous sections of New Jersey, the Garden State of America, is a group of farmers who have worked out for themselves one of the major problems confronting sweet potato growers. Centered around Swedesboro in Gloucester county, this group of farmers are building a reputation for growing "Chunks" which top the market.

The problem which these growers have solved is that of applying sufficient potash for profitable yields of sweet potatoes without injury to the stand. Large amounts of potash are essential to the growth of chunky tubers which the market demands. Sweet potatoes are grown largely on sandy soils naturally low in potash content. The tubers are very sensitive to injury when set in a soil having a high concentration of plant food. Therefore, the big proposition before many growers has been to get enough potash into the soil to give profitable yields of quality potatoes without injury to the stand.

In the years before the war, the common practice among many growers in this section was to use kainit in the fall on the land on which sweets were to be set the following spring. During the war, when potash was not available, the quality of the crop diminished until there were almost no "chunks," which depend upon potash for their formation. The percentage of long, slim, unmarketable "shoe-strings" was so large that there was no profit in growing the crop.

Following the war, when the problem of building up the supply of pot-

ash which had been depleted from the soil became uppermost, it was found that large applications, especially in the spring before setting, resulted in serious injury to the stand. About this time, Mr. H. A. Black, President of the Swedesboro Supply Company, Inc., who also had several farms in the community, began experimenting with the fall application of muriate of potash for his sweet potatoes. He found that although the muriate contained about four times as much potash as the kainit, profitable returns could be obtained with applications of muriate of potash up to 500 pounds per acre. Mr. Black obtained such good returns himself that he encouraged other growers to take up the practice. They, too, found it profitable, so that the practice has become well established in this section.

John Rode's Success

Typical of the farmers who have adopted the fall application of potash is John F. Rode of Swedesboro. Tall, thin from active participation in hard farm work, and with a keen eye gleaming with intelligence, Mr. Rode leaned against the fender of the truck from which he had just unloaded a load of prime sweet potatoes, and gave the writer his reasons for his fertilizer practices and his general views on the present farming situation.

"I am always ready to spend a dollar to make a dollar," Mr. Rode remarked. "The only way to make money is to produce. Am I right?" A check-up of his practices proves that he is right, and that the philosophy of farming which he has worked out for himself is sound.

John F. Rode is considered by his neighbors and by the business men in his community as an outstanding farmer, practical, level-headed, and successful. The system of farming which he has worked out for the light, sandy land which he cultivates, is one based upon his own experimenting for profits. He admitted that most of what he knows about farming he has learned from actual experience, and by keeping his ears open for helpful suggestions which he thought he could apply to his own work.

"Why do I use so much potash on my sweet potatoes?" he repeated, "because I found that during the war when I couldn't get potash, I couldn't raise sweet potatoes. Why do I apply the potash in the fall? Because in order to get a sufficient amount into the soil for the sweet potato crop and build up the reserve which was depleted during the war, without injury to the plants, I found it was better to make an application of part of it in the fall."

Sweet potatoes, tomatoes, and asparagus are Mr. Rode's cash crops. Corn and alfalfa are grown merely to make a convenient rotation and keep the soil producing to its greatest capacity. A field of 8 or 10 acres of corn is grown each year, and this field receives an application of 500 pounds per acre of muriate of potash in the fall before the corn is planted in the spring. The corn does not need this application of fertilizer. However, Mr. Rode explained that potash does not leach out of the soil and that this application for the corn crop made that much more potash available for the sweet potatoes which followed the corn.

About 20 acres of sweet potatoes are grown annually and are fertilized with a preceding fall application of 500 pounds of muriate of potash per acre, followed by a spring application of from 600 to 700 pounds per acre of a 5-8-5 fertilizer. Twenty acres of tomatoes receive from 600 to 700 pounds per acre of a 5-8-5 fertilizer applied in the spring; 25 acres of alfalfa receive only one-half ton of ground limestone per acre.

This year Mr. Rode cut 12 acres of asparagus and 7 more acres were planted. The asparagus is fertilized with 1,500 pounds of a 5-8-5 and 1,500 pounds of King Crab in the

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Soybeans Are Becoming Important *to the* South

By R. B. Fairbanks

THE soybean as a hay crop literally has leaped forward in the South in the past decade. It long has been grown for seed purposes in some sections of the South, but it is as a soil improver and more particularly as a producer of feed for livestock that it has gained such prominence in recent years.

One of the big problems with southern farmers has always been that of feed for the livestock. In fact, the lack of home-grown feeds has been the most serious drawback to the development of the livestock industry in the South. This lack of feed has been a serious detriment to cotton production in that many cotton growers have been buying much of the grain and roughage for their work stock, thus making it difficult to make a net profit on this type of farming. It is here that the soybean fits in, and during the last decade southern farmers have found out how profitably this crop may be grown.

For a long time the cowpea was the summer legume that was grown almost exclusively, but now that the merits of the soybean have become so well known the cowpea has been relegated to a second place as a summer legume in southern farming, except where very late plantings are to be made. The soybean is much more easily handled than the cowpea; the hay cures more rapidly; and there is not nearly so much shedding of the leaves of the soybean while curing, as is the case with the cowpea. Where planting is to be made after June 15,

Soybeans either can be planted in rows or broadcast.

Above: A good growth of soybeans which have been kept free from weeds by cultivation.

Left: While good stands can be secured by broadcasting, on rich land weeds get a good foothold.

however, the cowpea will usually produce a better yield of hay, but when planted prior to June 15, and especially when planted during May, the soybean is very much superior to the cowpea as a hay producer.

As a hay producer the Laredo soybean is one of the leading varieties. The stem is small and, therefore, produces a more palatable and more useable hay than those varieties producing the larger stems. The Laredo, however, will not produce the abnormally large yield that the larger growing varieties such as the Mammoth Yellow and the Biloxi will produce. Many claim that just as much useable hay will be secured from the Biloxi or Mammoth Yellow as from the Laredo, claiming that the residue, or that part which the livestock will not eat well, will serve as bedding and later as good manure. For this reason many plant the Biloxi and the Mammoth Yellow, but the larger percentage of farmers figure that the Laredo is the leading hay producing variety. Another advantage of the Laredo is its earliness. The Biloxi is quite late. The Otootan is a good variety, especially to plant with corn, but it is also a late maturing variety.

Methods of Planting

The practice of planting a hill of soybeans between each hill of corn at the same time the corn is planted is becoming more and more the custom. When planted at the same time the corn is put in, the yield of corn may be reduced slightly, but not to any great extent, and certainly not enough to offset the great value that will be received from the soybean both for soil improving purposes and as a producer of hay. Some plant two hills of soybeans between each hill of corn, putting four to six beans to the hill. It is probable, however, that one hill of beans to each hill of corn is more nearly right. When the corn is harvested and enough beans are picked for seed, the hogs, cattle, and other livestock may be allowed the run of the fields to eat the remaining beans and vines. Many cut the bean vines and store them, but more and more it is being found profitable to allow the livestock the run of these bean fields in the winter to do their own harvesting.

Generally speaking, however, those who want to get the most hay and the greatest quantity of high quality hay, plant the beans by themselves. It is usually best to plant them in rows two and one-half to three feet wide, planting from late April to early May and giving two or three cultivations. On very rich soil, broadcast seeding may be practiced, but as a rule this is not dependable, because weeds and grass are liable to choke out the beans. While planting in rows and cultivating two or three times makes the hay a little more expensive, yet it is the best method, except on very rich ground and usually then the row method is superior to the broadcasting method.

Even where soybeans are grown for seed, the soybean straw has been found an excellent winter roughage. Mules that are not at work, beef cattle, and dry dairy cattle can utilize it to decided advantage during the winter, provided a small amount of grain is fed along with it. It is a good roughage for any kind of livestock when properly supplemented with grain. Analysis shows that it is very much superior to corn fodder, stover, wheat, and oat straw. Generally speaking, it is figured that a good grade of soybean straw is worth about half as much as soybean hay or alfalfa hay. It is not depended upon as a roughage, however, for feeding to mules or horses when at work because of there being such a large percentage of indigestible material in it. It is excellent, however, for all kinds of cattle. The soybean hay itself, that is the stalk and the beans combined, when properly cut and cured, gives a hay that is equally as good as alfalfa and as a

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Onions

¶ 800 bus. per acre

By A. E. Wilkinson

Professor of Vegetable Gardening, Connecticut Agricultural College

ANDREW URE of Highwood, Connecticut, is considered one of the best market gardeners in the State and rightly so. With more than 53 years of experience in market gardening in the Highwood section, besides being a naturally systematic type of man, he could not be otherwise than an excellent grower.

While visiting his farm one day in July, he was harvesting a most excellent crop of onions. The illustration pictures over 800 bushels per acre of onions grown on his land. The picture was taken on July 22.

Between the rows of onions in the center of the illustration are planted late squash. Eight feet away another row was planted and so on throughout the patch. Thus Mr. Ure had two crops from his land in one year.

These onions were grown from sets of a variety known as Ebenezer, often called Japanese. Mr. Ure planted 22 bushels of sets per acre. The rows were 12 inches apart and from 8 to 10 sets were planted in every foot of row. The land was in a very high state of cultivation, and Mr. Ure, being of the older type of farmer, used considerable stable manure on his land.

Just how much he used he was unable to say, but he said, "Why speak about the manure used as I consider it largely a physical creator of soil conditions. I used 3,000 lbs. of 5-8-7 fertilizer per acre on this crop and feel that the artificial fertilizer and not the stable manure is the one to feed the crop."

All I can say is, that it was, because the results of over 800 bushels backed up Mr. Ure's statement.

Farms *Now* Are *Too* Cheap

By Arthur P. Chew

United States Department of Agriculture

FARMERS and others interested in agricultural real estate should pay more attention to the rule of the golden mean. In the war-time boom they erred from overoptimism. Now they err from excessive pessimism. It is hard to say which is the more disastrous mistake.

Overoptimism leads to inflation, which makes farming difficult by burdening it with heavy capital charges. Pessimism, however, leads to excessive deflation, which harasses the farmer by drying up the sources of his credit. In the last few years thousands of competent farmers have been unnecessarily separated from their farms because their creditors had too little faith in the future of the farming business.

In reacting against inflation, with its heritage of unwise speculation and overextended credit, the country has impaled itself on the opposite horn of the dilemma. In trying to get away from the blind confidence that boosts values falsely, it has given undue scope to the forces that depreciate real values.

Figures just issued by the United States Department of Agriculture plainly show that, taking the country as a whole, farm values are now below an earning basis. In other words, a conservative estimate of average farm earning power would justify a higher average farm valuation. All such statements are necessarily general. It would be imprudent to suggest that farms can be picked up at bargain prices anywhere. That farms generally are too low, however, seems to be undeniable. In the last eight years, though farm commodity prices and farm earnings have made substantial gains, farm land values have continued to fall. Some lag in the adjustment of valuations and earnings is usual, but the existing lag is very unusual.

Attention should be widely directed to this fact because an unduly depreciated farm realty market robs the farmer of his savings, makes his credit scarce and dear, and impairs his efficiency by sapping his courage. More harm may be done to agriculture this way than is done when values overestimate earning power. Right now thousands of farmers in the Midwest are having trouble with the renewal of conservative mortgages, because the mortgagees are too much influenced by the psychology of depression. This is bad for the country as well as for the individual farmers concerned. It tends to separate good men from the tools of their trade and to throw land into hands that cannot use it well.

Values Decline

Farm land values on March 1, 1929, for the United States as a whole were more than 30 per cent below the peak reached in 1920. In some states the recession from the 1920 peak runs up to nearly 50 per cent. These are stupendous declines, unprecedented in the Nation's history. They seem considerably to exceed what might be considered a natural or logical reaction from the inflation of the preceding boom. In order to justify a cut of 50 per cent in the farm values of an agricultural state, it would be necessary to assume that the previous level was twice too high; in other words,

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Starting a Scare

Left: Damon and Pythias are proverbial as the closest friends the world has known. It is not without cause, therefore, that Jack, the cockerel, and Cocktail, the horse, have been called the Damon and Pythias of the animal kingdom. They are constantly together at horse shows all over England. Jack is shown perched on the head of his equine pal.

Below: Some Maryland farmers still use the ox-cart to haul their tobacco to market. Oxen have done this job in the "Free State" since Colonial times. A farmer can smoke a good bit of tobacco while getting his crop to the warehouse or wharf.

Right: Here is stoicism for you. This elephant in Bronx Zoo, New York City, endured great pain while a dentist worked on a sore tooth. The expression in the eye registers more than a roar or bellow could the fright and suffering which the animal is subjecting to his confidence in men.

Below: In the Ghetto, lower East Side, New York City, there are many commercial transactions involving less than five cents. Bread from brown loaves is sold by the slice in Norfolk Street. The bread seller will cut off the slice of bread and butter it for his customer. The buttor is two cents extra. The bread is German "black" rye.

Above: This view of the country near Brest, French Brittany, shows the small fields with their dirt fences. The river in the foreground is used by the farmers to haul their produce. (See story on page 43.)

Left: This church at St. Thegonnec was built in the 13th century and is typical of the architecture of Brittany.

Below: In Brittany the common way of hitching a team is in tandem. The farm implement in this picture is a cultivator.

Above: The houses in Brittany are in groups or villages. The thatched roof of this typical country house covers the house on the left, the barn in the center (in white), and the storage on the right. (See story on page 43.)

Right: Mr. George Gloux, Ingenieur Agronome, Pontivy, Brittany, in front of the church at Locronon.

Below: The market square at Morlaix is typical of the market squares in Brittany. Note the big two-wheeled cart.

Agricultural courses are made intensely interesting to boys and girls through demonstration and actual observation of living things. Here a group of students in Florida are examining citrus insects through a microscope.

This county agent in Missouri is demonstrating the field selection of seed corn to a group of boys who have entered a 5-acre field contest. The year before, these boys stored more than 700 bushels of early selected seed corn.

The Editors Talk

Plant Food Ratios

There is a great deal of talk about plant food ratios that farmers should use in fertilizing their crops, that is, the ratios between nitrogen, phosphoric acid, and potash. In connection with the theoretical ratios or the ratios that have been determined by laboratory and experimental work, it is important to determine what ratios are being used by the farmers themselves and what changes have been made in these ratios.

The farmer pays the bill. Therefore, if the ratio which he is using does not correspond with the official recommendation, there is some probability that there are other factors influencing the ratios actually used other than the plant food requirements as determined by experimental work.

The research workers in fertilizers at experiment stations have been concerned primarily with determining the plant food requirements of the various crops. Data on the actual ratios used can be approximated for many states from the annual fertilizer reports which are published in connection with the state fertilizer laws and the regulatory work on fertilizers done by the state fertilizer control boards.

The most striking change that has occurred in these ratios used by the farmers as determined from this source has been a marked increase in the amount of nitrogen in mixed fertilizers. In the northern states the nitrogen content is now some thirty to fifty per cent more than the prewar content. This probably in large part is due to the lower prices especially of mineral and synthetic nitrogen. The index number of this group of fertilizer materials has been notably lower than prewar and also lower than all the rest of the fertilizer materials.

The second striking feature, accompanying this upward trend of nitrogen, has been an upward trend in the amount of potash in mixed fertilizers. This increase in the amount of potash primarily has been a recovery from the low levels during the war period. In some states this increase in potash has brought the potash content above the prewar level.

In nearly all states the percentage of phosphoric acid is higher than prewar. The fluctuations in the phosphoric acid content of mixed fertilizers have been less violent than in the case of the other two plant foods.

Roughly, for the northern states, the ratio is one of nitrogen, to three of phosphoric acid, and two of potash. In the South the ratio is more nearly one of nitrogen, to three of phosphoric acid, and one of potash. The striking feature in the South is that the nitrogen and potash in mixed fertilizers are usually in equal proportions and in some of the important southern states seem to move up and down together. Similarly in the South, the recovery of potash from its low post-war point has been noticeable.

It is undoubtedly true that the price of fertilizer materials affects the ratio used by the farmer. We may experiment all we like to determine the ideal ratios for maximum crop production, and this work is essential, of course, but in the end the ratio actually used probably will be influenced not only by the

agronomic need as determined by such experimental work, but also by the prices of the different plant food materials. Changes in the relationship between the prices of these plant food materials probably also will affect the ratios commonly used.

It is probably true that our chief fertilizer crops ten years ago required just as much nitrogen and potash as they do now. The agronomic need has not changed. Ten years ago the prices of both nitrogen and potash were much higher than they are now. The ratio of nitrogen and potash to phosphates was much wider then than at present. The narrower ratios now used are due in part to the lower prices of nitrogen and potash.

This all goes to show that studying simply the plant food requirement, no matter how perfected the technique may become, will not alone determine the ratio that the farmer will use.

Teaching Teachers

On page fourteen of this issue is an account of the first summer school for extension workers ever held in America. We would like to call the special attention of our county agent and teacher readers to this story for the reason that the success and favor with which this school met undoubtedly will result in the demand for and establishment of other schools.

The first school, which was held at the Wisconsin College of Agriculture, gathered its students from experienced extension workers and teachers of agriculture in eleven states. This contact of workers from different sections of the country engaged in the same line of work was in itself of great value to the individual student. Ideas were exchanged and taken away from the courses, which undoubtedly will have effect in stabilizing the effectiveness of extension work.

Dr. C. W. Warburton, director of extension work of the United States Department of Agriculture, after visiting the class in July declared:

"A forward step has been taken this summer at the University of Wisconsin in providing opportunity for extension workers to take advanced training designed to enable them to better meet the problems of their profession. As extension work grows older and becomes better established, there is a constantly growing demand for a better trained personnel. From the experimental beginning made this year, I look for marked development in the opportunities provided extension workers for advanced training.

"That extension workers are interested in opportunity for advanced training in their profession is shown by the genuine interest in the course," Director Warburton said. "Although nearly half of the state colleges of agriculture are offering some undergraduate training to juniors and seniors interested in taking up extension work, the course offered by the University of Wisconsin this summer provided graduate training for experienced extension workers."

Many county agents, teachers, and other extension workers will appreciate knowing that there is now a school in which they can expect a solution of the problems which have arisen in their work and for which they were not prepared. Wisconsin is to be congratulated in pioneering the movement for the advanced training of extension workers.

Fertilizer Tonnage

Now is the time that a lot of people will start calculating the fertilizer tonnage for next season, the amount which will be sold by next June. What is the outlook?

Fortunately, at the present date the outlook is better than at this time last year, although, of course, there is yet time for a good many things to happen. But bearing this in mind, at present some of the chief fertilizer crops are selling for higher prices than they were at this time last year.

In September the average farm price of cotton was 18.2 cents, compared with 17.6 cents in September, 1928. While this is a small increase per pound, it is a significant increase when the total crop is considered. Furthermore, it is significant to note that the cotton crop east of the Mississippi river will probably be larger than last year, and it is in this territory that most of the fertilizers are used.

In some sections the price of tobacco this fall has been greater than last fall. In other sections the situation has been reversed. It is still somewhat early to determine whether or not the total value of this year's tobacco crop will exceed that of last year.

The price of potatoes in September was more than twice the price at the same time last year. The crop will be considerably smaller, but as a general rule the farmer receives more money for a small crop of potatoes than for a large one. The chances are, therefore, that the farmers' income from this crop will be higher than last year.

The income received from these three crops has a very significant influence on the total fertilizer tonnage. At present, therefore, still bearing in mind that it is very early in the season, the outlook is better than the outlook a year ago. On the one side the purchasing power of the fertilizer consumer apparently is going to be greater than last year.

On the other side is to be noted a decline in the wholesale prices of some fertilizer materials. There has been a decline in the prices of mineral nitrogen and phosphoric acid. Organic nitrogen also is lower. The price of potash in September was four per cent less than the prewar price.

This feature of lower fertilizer prices in conjunction with the increased purchasing power of the farmer gives reasonable grounds for believing that the coming fertilizer season will be better than the last season.

Applying Science

While we may not agree fully with Dr. R. B. Von Kleinsmid, president of the University of Southern California, that the lack of scientific method based upon widest information and wisest application is at the root of the troubles of the farming industry, there is much food for thought in the idea.

Dr. Von Kleinsmid recently gave an address, "Today's Laboratory is Tomorrow's Industry," before 5,000 bankers assembled in convention at San Francisco. He asked if it were not the failure of the farming industry to see the truth of the discovery and adoption of new methods that was responsible, in

part at least, for the present low ebb of agriculture and the alarming spread of sterile acres all over the country.

He called attention to the 300,000 farms which have been abandoned annually and stated that this was not to be wondered at in view of the fact that of the 86,000,000 horsepower on American farms, only 3,000,000 represent the product of machinery.

"To prove the assertion that research pays dividends," he said, "one has only to point to the activities and prosperity of General Motors, American Telephone and Telegraph, and Standard Oil—to name the largest corporations which make up a very appreciable amount of the $65,000,000 which industry invests in research every year."

It often has been said that there is enough scientific data as the result of experimental work at the colleges of agriculture in this country to revolutionize our whole American agriculture. The big job now is the job of the extension man—to get the farmers to apply science to their farm practices.

Well I'll Be —

There seems to be no end to the remarkable stunts being tried with cows. It wasn't more than two month's ago that we heard of the 1,200-mile hike to the National Dairy Exposition which two Ayrshire cows were taking. Now the Guernsey breed breaks into the headlines with an experiment whereby three Guernsey cows were milked by radio.

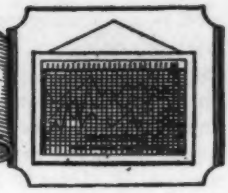
"Only cows with sense enough to operate a radio set will be in demand by future dairymen," the news announcement says. "If a cow hasn't education enough to tune in on its owner's little broadcasting station when it comes milking time, it might as well pack up its lunch and start for the nearest butcher shop.

"Three Guernsey cows were led into a hotel in Racine, Wisconsin, connected to a milking machine, and the machine started by an electrical impulse sent from a broadcasting station some distance away. One cow donated seventy-five pounds of milk by way of radio. With such a system a farmer could load his portable broadcasting set into a car and go fishing for a week, his only care being to remember to press the milking machine button night and morning. Another button might call the chickens and crow like a rooster if necessary. Another button could be added to feed the pigs, throw down hay, and water the sheep. Still another button might be attached for winding the clock and putting the cat out at the proper time.

"If science continues to advance by 1950 a farmer can quit agriculture and go into the electrical button business on a large scale."

In all seriousness, the above incident opens our minds to wonder at the great developments in science as applied to farm practices which may take place in the next few decades. We have only to consider the advancement in electrical usage, in air transportation, in the radio, and various other fields, to realize that we may live to see in actual farm practice, what may seem impractical and even almost impossible now.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

THE TRUTH ABOUT NECTARINES

The nectarine, the fuzzless peach, has received a great deal of attention from the New York State Agricultural Experiment Station, which this year put on an exhibit of this fruit at the State Fair that proved very popular. Dr. U. P. Hedrick, Director of the Station, says this fruit is only now coming to be appreciated. The lack of good varieties, he says, is one of the principal reasons that nectarines have not found more favor in the East, but that the experiment station has more than 30 different sorts in its orchards, two of which are highly recommended—the Hunter and the Sure Crop.

"The nectarines," says Dr. Hedrick, "are peaches in every respect except that they lack the fuzziness which characterizes the peach. Nectarine trees can not be told from peach trees unless the fruit is present. There are clingstone and freestone varieties of nectarines, just as there are of peaches, while the flesh of the nectarine may be red, yellow, or white."

FOREST FIRE EXPERIMENTS

Anyone who has seen a forest fire would hardly expect such a dangerous thing would ever be created for experimental purposes, but that is just what Raphael Zon, of the Lake States Forest Experiment Station, is planning to do. A tract of forest land consisting of several sections in the sandy, jack-pine belt near Roscommon, Michigan, will be used. This area will be surrounded by a 300-foot fire line and divided into lots of 20 to 40 acres. Fires will be set in order to determine the effect of such factors as temperature, humidity, wind velocity, and inflammability of the duff. Fires will be set during the spring summer, and fall; in the morning, noon, and evening; and under all sorts of wind, weather, and other conditions. Reforestation of the burned-over land will also be studied.

DON'T WASTE FERTILIZER

Fertilizer application by present-day-machinery, says the U. S. Department of Agriculture, is only about 50 per cent efficient. Specialists in the department are now working toward the improvement and standardization of distributing machines, and are also trying to improve the drilling qualities of fertilizers. A. L. Mehring, of the Bureau of Chemistry and Soils, talking before the recent meeting of the American Chemical Society at Minneapolis, said: "The principal qualities of fertilizers that affect their distribution qualities are the tendency to absorb moisture, fineness or coarseness of particles, physical uniformity, apparent specific gravity, and friction and cohesion between particles. The kind of weather to which the fertilizer has been exposed has a great deal to do with the mechanical condition of the fertilizer. This scientist reported that dry nitrate of lime drilled very

well in an atmosphere of 40 per cent relative humidity, but became very soggy and drilled poorly in an atmosphere of 50 per cent relative humidity, and at 60 per cent it was entirely liquid. Sodium nitrate, which drilled well at 40, 50, and 60 per cent relative humidity, could not be handled in the distributor when the humidity was 70 per cent or higher. Superphosphate was too dusty at 40 per cent relative humidity, and too damp at 90 per cent, but could be distributed at any humidity under 90. The concentrated phosphates-ammophos, monoammonium phosphate, and monopotassium phosphate, drilled well in all humidities up to 90 per cent. Urea, ammonium nitrate, and leunasalpeter —concentrated nitrogenous fertilizers —behaved much like nitrate of soda, although urea, like ammonium sulphate, could be drilled at humidities 10 per cent higher than could nitrate of soda.

Since some mixed fertilizers tend to separate because of the vibration of the distributor, the department specialists recommend mixing the fertilizers in small, readily drillable particles. This will reduce loss resulting from poor drillability and poor and improper proportions of the various elements.

KEEP IRON OUT OF MILK

People shouldn't try to get their iron ration from milk. If much of the advertising we have seen is correct, they much better depend on raisins and spinach. According to scientists at the University of Wisconsin, the cow puts as much iron in milk as ought to be there. More iron spoils the flavor of dairy products. It is found by these investigations that 24 hours' contact of milk or cream with a rusty can will increase the iron content of the milk 250 parts per million, while only one part per million produces an off-flavor—metallic in milk and cream, and tallowy and fishy in other dairy products. Some manufacturers, knowing the importance of this iron factor in the quality of their products, are installing equipment of stainless steel, nickle, aluminum, and some with glass lining.

WATERMELON COMPETES WITH BEE

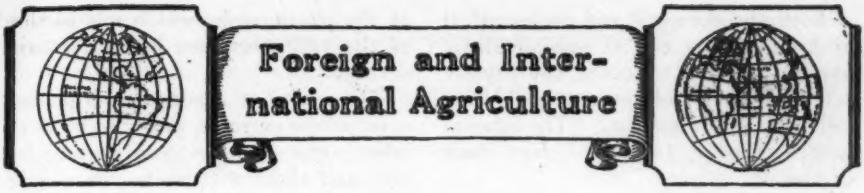
A report from Russia says that a sirup factory recently established at a town on the Volga River is using watermelons in place of sugar cane or beets, making a sweet known as "nardek." It is an old process in the region, but has never before been carried on in a factory. Honey-bees are said to be scarce in the locality as a result of the melon competition.

HORSES AND MUSHROOMS

The automobile industry has been worrying the mushroom growers, for the mushroom growers have always looked upon horse manure as very necessary in the production of a good crop of high-quality mushrooms. It has been harder and harder to get enough of the manure to grow this crop to supply the steadily growing demand for these tender buttons. However, Edmund Lambert, of the Department of Agriculture, has had considerable success in growing them on what is called artificial manure. This manure is made by mixing straw with chemicals, such as ammonium sulphate, superphosphate, and ground limestone. The damp straw, treated with these chemicals, rots and forms a manure which seems to provide the right sort of plant food.

BLUE WINDOWS FOR THE COWS

The dairy barn at the University of Nebraska has had its windows painted blue—and the cows are well pleased, and probably give more milk. The cool, subdued light discourages flies. The paint will be removed after the fly season.



Picturesque Brittany

By G. J. Callister

AUTHOR'S NOTE: For the opportunity to make a tour of Brittany and for the information derived from this tour, I am deeply indebted to several people, particularly to Mr. J. LeCornec, General Manager, Societe Commerciale des Potasses d'Alsace, and to Mr. A. Bruno, Directeur du Service Scientifique et Agricole, Societe Commerciale des Potasses d'Alsace, which gentlemen made it possible for the tour to be undertaken.

For faithful, cheerful, and unremitting guidance on the tour itself, I am indebted to two gentlemen, Mr. J. Henry Debieve, Mulhouse, and Mr. George Gloux, Ingenieur Agronome, Pontivy, Brittany. Without their help we could not have properly seen Brittany.

I have also to thank a host of others whom we met in Binic, Perros, Landerneau, Morgat, Quimper, Riec, Vannes, Rennes, and other places in Brittany. I am very glad that I had the opportunity to talk to farmers, merchants, business men and agricultural advisors in these places and regret that limitation of space does not permit my giving more individual appreciation.

THE lure of Brittany is that it is a country not afraid to be different. It is a welcome oasis in this modern age of uniformity and sameness.

Driving along the highways and byways of Brittany, one is impressed with a land of stimulating and charming contrasts, in the Breton architecture, in the sea and landscapes, and in the people. Picturesque contrasts of the old and the new voice a culture rooted deep in the history of the centuries, but withal sympathetic to the present.

What is more picturesque, for instance, than Mademoiselle Louise Charle standing beside the old well in the square of the ancient village of Locronon? Note the white lace cap and black dress, which by the way were not donned solely for the photograph. Lace caps and headdresses of different types and colors, varying according to the district of Brittany, are part of the every-day working equipment of many of the women-folk of the countryside.

In another photograph, note a group on the beach at Vel-Andre—the ladies in the foreground in the every-day Breton costume, while immediately behind are ladies in the most modern of modern dress. Men dress differently, too. Note the man in the market square.

Both the domestic and ecclesiastical architecture are full of individualistic appeal. Dotted over the countryside are many old and interesting houses, villages, and churches. The photographs on pages 34 and 35 show some of them.

Geographically, Brittany is a rocky peninsula on the west coast of France, thrust out into the sea between the English Channel and the Atlantic Ocean—"an ancient province and duchy of France," comprising about 18,630 square miles, or about one and one-half times as large as the State of Maryland. The greatest distance between the Channel and the Ocean is 155 miles.

Brittany is distinctly and popularly divided into two zones, the inland and coast zones, the inland area being dominated by two plateaus, in many places covered with moorland, presenting a somewhat rugged and wild aspect. The highest points are about 1,100 feet. Between the two inland plateaus and the sea is the coast zone, circling Brittany on the northern, western, and southern shores. The roads and arable land of the coast region are on the whole better developed than is the case inland. Generally speaking, the best farm land is in the valleys near the sea, as shown in one of the photographs which is a picture of the valley between Brest and Landerneau.

The coast line is rugged and picturesque in the extreme, indented by bays, inlets, and estuaries and surrounded here and there with reefs and islands. The Gulf of Morbihan on the South coast is particularly picturesque and well worth a visit.

Politically, Brittany comprises approximately the departments (which correspond somewhat to counties in America) of Cotes-du-Nord, Finistere, Ille-et-Vilaine, Morbihan, and Lower Loire.

In all departments agriculture predominates. Industry is developed, especially in some of the seaport towns. Brest is also an important naval base, but the backbone of Brittany still is her agriculture.

The soils are formed largely from schists, gneiss, and granite. In many areas the soils are thin and not naturally the most fertile. The development of Breton agriculture has, therefore, not been easy. According to the authorities this development started in the fifth century when the Celtic inhabitants of the country founded monasteries and "helped to clear the land, the greater part of which was

(*Turn to page* 59)

Mr. J. Henry Debieve points out a manure pile built on a cement bottom. Underneath is a pit for the liquid manure.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"A Study of the Effect of Commercial Fertilizers on the Performance of Peach Trees," is the title of Bulletin 239 of the Arkansas Experiment Station. The authors, J. R. Cooper and C. B. Wiggans, present a most interesting discussion of their data, which lends itself to a variety of interpretations concerning the influence of the three essential plant food elements, separate and in combination. The unique layout of the experiments involving N, P, and K alone; N—P; P—K; N—K; N—P—K; NN—P—K; N—PP—K; N—P—KK with yield data, production and handling costs, value per acre, and profit or loss, for each treatment for a period of four years, makes this bulletin a most valuable contribution. The arrangement of the three most profitable treatments (average of four years) are as follows: First, N—P; second, N—P—KK; third, N—K. The basic analysis was a 3-8-3 or the equivalent of 1½ pounds of nitrate of soda, 4 pounds of superphosphate, and 1½ pounds of kainit per tree per acre.

Another very interesting and important bulletin is No. 63 of the Virginia Truck Experiment Station, giving the results of two years' work on the study of synthetic nitrogen salts on the fertilization of spinach. This bulletin should prove of value to the fertilizer mixers and to farmers who mix their own fertilizer materials.

The sweet potato acreage in the Atlantic Coastal Plain, as well as the value of this crop is very large. That larger profits are possible with the proper methods of cultivation and with careful attention to fertilization is conclusively shown in Bulletin 66 of the Virginia Truck Experiment Station. Data from 15 fertilizer treatments determined by use of the triangle method covering a period of eight years shows that high potash, low phosphorus, and low nitrogen formulas proved most effective. The most satisfactory amounts of these elements were 150 pounds of actual potash and 30 pounds each of phosphoric acid and nitrogen per acre. Every sweet potato grower and agricultural leader should have a copy of this bulletin for ready reference.

"A Field Test for Available Phosphorus in Soils," Agr. Exp. Sta., Bul. 337, Aug., 1929, R. H. Bray.

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Clemson College, S. C., Bul. 259, Aug., 1929, R. N. Brackett and D. H. Henry

"Cyanamid, Its Uses as a Fertilizer Material," U. S. D. A., Washington, D. C., Cir. 64, May, 1929, F. E. Allison.

Crops

A timely leaflet coming to hand this month is Pennsylvania's Circular 127, "Potato Grading," by J. B. R. Dickey. Grading in marketing is assuming such importance that this circular should serve an urgent need for the information in respect to the potato crop. It will undoubtedly find its way to a large majority of the growers in the eastern states.

Another timely publication is South Carolina's new circular 37, "Winter Cover Crop Experiments,"

by T. S. Buie. In his study, the author sets forth the information gained from experiments conducted at the college to determine the best practices of growing the cover crops best suited to the soils of South Carolina.

"Sweet Sorghums for Syrup and Forage," Agr. Exp. Sta., Fayetteville, Ark., Bul. 241, June, 1929, C. K. McClelland.

"Cotton Breeding Studies," Agr. Exp. Sta., Fayetteville, Ark., Bul. 243, June, 1929, J. O. Ware.

"The Japanese Persimmon in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 205, June, 1929, A. F. Camp and Harold Mowry.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. XII, No. 1, Aug., 1929.

"American Potato Journal," The Potato Assn. of America, East Lansing, Mich., Vol. VI, No. 7, July, 1929, and No. 8, Aug., 1929.

"Extension Service for New Hampshire Farms and Homes," Ext. Serv., Durham, N. J., Bul. 35, Feb., 1929, J. C. Kendall.

"Report for 1928," Agr. Exp. Sta., Durham, N. H., Bul. 238, Feb., 1929.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, July-Aug., 1929, No. 139, and Sept.-Oct., 1929, No. 140.

"Selecting Fruit for Exhibit," State Hort. Soc., Inc., Knoxville, Tenn., Bul. 2, June, 1929, E. M. Prather.

"Varieties of Cotton for the Blackland Region of Central Texas," Agr. Exp. Sta., College Station, Tex., Bul. 399, July, 1929, D. T. Killough, Henry Dunlavy, and H. E. Rea.

"Ornamental Plants for the Home Grounds," Va. Truck Exp. Sta., Norfolk, Va., Bul. 62, Jan. 1, 1928, M. M. Parker.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 260, Aug., 1929, and Bul. 261, Sept., 1929.

Economics

The new bulletin 202, by H. G. Hamilton of the Florida College of Agriculture, discusses the "Cost of Handling Citrus Fruit From the Tree to the Car in Florida." The purposes of this investigation as stated by the author were first, analyzing the facilities for handling citrus fruit in Florida; and, second, determining the cost and the factors influencing cost of handling citrus fruit. He found that the average cost per box for handling citrus fruit from the tree to the car was 95c for the 1924/5 season, and $1.04 for 1925/6. A combination of large capacity packing-house and high percentage use greatly decreased the cost per box. This study indicates that some of the important factors in the efficient handling of citrus fruits are a reasonable investment per box, adequate volume, large volume per car capacity, large volume per grower, and an efficient arrangement of packing-houses.

"An Economic Survey of Salt River Valley Project in Maricopa County, Arizona," Agr. Ext. Serv., Tucson, Ariz., Ext. Cir. 59, June, 1929.

"Returns from Different Systems of Farming on the Salt River Valley Irrigation Project," Agr. Ext. Serv., Tucson, Ariz., Ext. Cir. 60, Aug., 1929, Byron Hunter and Harry A. Stewart.

"The Farm Credit Situation in Southwestern Arkansas," Agr. Exp. Sta., Bul. 237, June, 1929, B. M. Gile.

"Organization and Management of Tomato Canning Factories in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 240, June, 1929, Carlos E. Campbell.

"The Consumer Demand for Apples," Agr. Exp. Sta., Amherst, Mass., Bul. 250, Apr., 1929, Lorian P. Jefferson.

"A Local Farm Real Estate Price Index," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 96, Mch., 1929, F. M. Thrun.

"What Makes Some Farms Pay," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 187, Feb., 1929, E. B. Hill and F. T. Riddel.

Insects

"The Known Predacious and Parasitic Enemies of the Pea Aphid in North America," Agr. Exp. Sta., Madison, Wis., Research Bul. 93, June, 1929, C. L. Fluke.

"The Mexican Bean Beetle in Eastern Virginia," Va. Truck Exp. Sta., Norfolk, Va., Bul. 65, Oct. 1, 1928, P. J. Chapman and G. E. Gould.

Diseases

"Smut Control in Cereals," Agr. Col. Ext. Serv., Lincoln, Neb., Ext. Cir. 132, July, 1929, P. H. Stewart and D. L. Gross.

"Supplements for Copper Fungicides," Agr. Exp. Sta., Amherst, Mass., Bul. 252, June, 1929, E. B. Holland, C. O. Dunbar, and G. M. Gilligan.

"Fusarium Wilt of Tomato in Virginia," Va. Truck Exp. Sta., Norfolk, Va., Bul. 64, July 1, 1928, F. P. McWhorter and M. M. Parker.

Winter Legumes

(*From page* 18)

potash applications on winter legumes has not been as outstanding as that of superphosphate, no doubt tests will demonstrate that a proper balance between fertilizers will be most profitable in fertilizing winter legumes. Sandy soils, where greatest profits are made from green manuring, are usually most deficient in potash and no doubt part of the increased yield is due to the effect of the potash in the green manure and its effect on the availability of the soil potash.

A good crop of winter legumes will take from the soil and make available to the following crop the equivalent amount of potash contained in 100 pounds of muriate of potash which is more nearly the amount needed than is commonly supplied in commercial fertilizers. Trials show that unless liberal amounts of potash are supplied to the main crop, poor stands and greatly reduced yields from the use of green manures may result.

As with phosphates, it is clear that the potash supply rapidly will be depleted unless provisions are made whereby the supply is replenished through the wise use of commercial fertilizers. Some comparisons of winter green manure crops with commercial fertilizers are unfair to the latter because fertilizer practices are followed which favor the use of green manures and tend to exaggerate their value. The ratio of fertilizer elements in the green manure crop is usually better balanced than that of the commercial fertilizer used and naturally best results are obtained with the green manure. Besides no account is taken of the future fertility of the soil as effected by plowing in large amounts of organic material.

The winter legume idea for soil improvement and increased crop production in the South has a big kick because of the immediate return on the investment and the non-interference with the one-crop system of farming, but more attention must be given to the wise use of commercial plant food in connection with green manuring if the greatest benefit to both the man and land is realized. Many farmers are simply cashing in on fertilizer residues and leaving their land poorer than if no legumes were ever grown.

Extension Workers' School

(*From page* 16)

cool Lake Mendota with its fish, swimming, and refreshing summer breezes. The summer was a most enjoyable one as well as thoroughly informative and worth while from an educational standpoint.

The great majority of students declare they will return next summer and continue their course of study in extension methods when additional and more advanced courses will be available in psychology as applied to extension, rural sociology, farm relief, and the entire field of agricultural journalism and advertising from a publicity and promotional angle.

"In the future," says Mr. Wilson, "it is highly likely that there will be established throughout the country in four or five geographically strategic centers courses of instruction similar to this pioneer course begun last summer at the Wisconsin College of Agriculture. I feel that these courses will aid members of the various extension forces to do considerable original research that will prove of great value to the entire extension movement. They will, no doubt, be a powerful force in making extension a profession of the highest calibre."

Future Farmers

(*From page* 24)

At the state meeting of the Future Farmers of Georgia, there were three or four delegates from each of the 54 local chapters of the state. During the State Meeting, officers were elected, a public speaking contest was held, and the state stock judging contest was conducted. Each delegate of the 185 present, at some time during the conference, which was held as round table discussions, was on his feet and took part in the discussions before the body. Such training tends to take away from the farm boy the inferiority complex from which many of them suffer.

"Georgia Planters"

The 11 boys, who were raised to the "Georgia Planter" degree, the highest conferred by the state organization, have deposited in a bank or profitably invested more than $5,000.00, an average of $473.27 each, which they have earned from projects carried on as a part of their agricultural instruction. They all at some time or other had been members of stock judging or other teams, had an average of 85 or above on all high school subjects, and showed leadership ability.

Not long ago it was my privilege to visit the Southwest Dekalb School, on the day the Future Farmers were doing their banking. The treasurer of the local chapter received the money each member had to place on savings. The amount was entered in the member's thrift book and a record of it placed in the treasurer's book. The total amount of the money deposited by the chapter members was carried to the bank and placed on deposit as one account. By this system the members were allowed to deposit very small amounts. Several of the members who started with very small amounts now have a nice savings account that has been built up by small deposits each week.

"The value of this thrift bank," said H. S. S. Munro, instructor at Southwest Dekalb, "is that it teaches the boys to systematically save a part of whatever they are making."

The Future Farmers of Georgia as well as other states are putting into practice the purposes of the organization, and as a result are receiving training that will no doubt have a marked effect on the agricultural situation of the nation in a very few years.

Dry Beans

(*From page* 19)

found in the northern part of the United States and throughout the West, though they are always grown in gardens in practically all parts of the country.

In 1928 the United States bean acreage was estimated at 1,577,000 acres. The average yield per acre was 10½ bushels, the total production 16,598,000 bushels. The price average for all varieties was placed at $4.17 per bushel, making an aggregate value of the crop of $69,294,000. This clearly makes the dry bean one of the important minor crops in the United States. The acreage maintained at the present time is about

twice that of prewar years and nearly four times that of 1899. It has not increased, however, during the last five-year period. Yields have been somewhat lower in recent years.

The most important commercial region in the United States is an area including Michigan and New York. Here the white pea bean is most commonly grown, although other varieties such as the large white and the red kidney bean are also common. The white pea bean makes up about 32 per cent of the United States production, the large white about 4 per cent, and the red kidney about 6½ per cent.

A second region of commercial importance is the interior valley of California and along the southern coast of that state where white beans known as large and small Californians are extensively grown. In recent years this area has declined somewhat in importance. A third region of importance centers around the states of Colorado and New Mexico where a bean variety known as "Pinto" is most important there, this variety making up about 13 per cent of the United States production. Lima beans are quite largely grown in California. They comprise about 13 per cent of the nation's production.

Ordinarily beans grow on a great variety of soils, but probably do best on limestone soils of moderate fertility. They are usually grown in rotations with other crops and their commercial distribution in the United States is largely determined by such factors as diseases, insects, and the competition of other crops.

World statistics on this crop are not as satisfactory as for most others. Old data, going back to prewar years, indicate that India grows about 55 per cent of the world acreage, Japan following in second place with 10 per cent. The United States, from the standpoint of world production, is not one of the leading nations in bean production, producing about three per cent of the world's acreage in these prewar years.

Soybeans Are Important to South

(*From page* 28)

matter of fact, contains slightly more digestible nutriments than the alfalfa. The digestible nutrients of five good quality hays are as follows:

	Per Cent
Soybean	53.6
Cowpea	49
Alfalfa	51.6
Red clover	50.9
Timothy hay	48.5

This shows that the soybean hay leads the next highest one, alfalfa, by 2 per cent in total digestible nutrients.

Many have found that by planting sorghum and soybeans together, that is, one row of soybeans and one row of sorghum, that the maximum amount of feed may be produced. These two when fed green as a soiling crop have been found excellent for all kinds of cattle, mules, and horses that are not at work. It also makes a good feed for hogs.

The soybean, being a legume, naturally takes nitrogen from the air and stores it in the soil. Cotton planted after soybeans frequently yields 25 to 50 per cent more than cotton on similar land planted after corn or cotton. The soybean, therefore, is an important crop from the soil building angle, and yet to get the best results from this crop, under average conditions, it needs to be fertilized. When planted on soil that is not very fertile, a small amount of nitrogen even will be found profitable, although two per cent is about as much as usually is found advisable. However, liberal applications of su-

perphosphate and potash are quite desirable under average conditions. From 400 to 600 pounds per acre of a fertilizer running 2 per cent nitrogen, 8 to 10 per cent superphosphate and 4 to 8 per cent potash is about the analysis that has given best results. The higher per cent of potash is desirable on many soils, especially those that contain much sand. While the crop can be grown without fertilizer, yet it cannot be grown most profitably without it, and as said above, except where the ground is quite rich, at least 1 to 2 per cent nitrogen should be used along with liberal applications of superphosphate and potash.

Viewed from every angle, the soybean is unquestionably a profitable one in the South and is rapidly becoming a crop that will be grown on every southern farm. It is doubtful if many southern farms can be operated most profitably and economically without making use of the soybean in some way. The fact that it is good for so many different purposes makes it one that will fit in with almost any system of farming. It is fine as a soil improver, produces seed that can usually be sold at a profitable price, and above all, produces a high quality hay which the southern farmer needs so badly.

Maine

(*From page* 13)

of breeding by ear selection, plant selection, and even ear to row selection, have little value in increasing yields of well-bred varieties, and the quality of sweet corn, while partly due to varietal differences, is primarily dependent upon climatic conditions and length of time from picking to packing. For several years bean tests have been conducted to determine varieties best suited to Maine.

Work is now being done on inheritance of certain characteristics in relation to yield and quality in certain grains and vegetables, clover failures in potato rotation, cut-worms affecting vegetable crops, effect of lime on soil and relationship to growth of clover and alfalfa, and varieties of vegetables adapted to Maine conditions.

Maine has done much along livestock lines. During the early days extensive research was done to determine the food value of feeds. Later the results of poultry research was of outstanding importance. The open-front, unheated house was found to be better than the old, closed and heated type. The mode of inheritance of egg production as a result of which it was possible to systematically improve flocks is a product of breeding research done at the Maine Station. The management and disease bulletins published years ago giving the results of poultry

Potato fields of this size and larger are commonly found in Aroostook county, Maine.

investigations probably had the widest call of any bulletins ever published anywhere up to that time. At present two important investigations are in process, (1) physiology of reproduction including sex determinations and (2) growth and ricket studies.

In the field of research involving cattle, much was done along breeding and management lines to influence increased production, including the determinations of the effect of inbreeding upon production and the milk yield and butterfat percentage transmitting power of bulls and cows. Lactation and cattle disease studies have been carried out. The effect of temperature upon rising quality of cream and the effect of feed upon quality and hardness of butter are but two of several dairy investigations.

The results of years of animal husbandry research are now being brought to conclusion. During this time thousands of records of registered cattle have been studied to determine, if possible, the criteria for measuring inheritance of milk yield and butterfat percentage, as a result of which it has been possible to prepare a formula or equation by which milk production can be predicted. Perhaps the most outstanding evidence of the practicability of this research is the fact that the largest company operating commercial dairy farms keeping several thousand cattle has indicated its intention of using the results of these investigations. Incidental to arriving at the foregoing conclusions were studies involving the relationship of age and body form to gland secretion, the results of which were somewhat contrary to the old body points formerly accepted as indicating high producing ability. Body size as measured by weight and the structural form as indicated by the form taken by the shoulder girdle were found to be the outstanding body characteristics influencing milk secretion.

Most of the chemical and much of the entomological investigations have been carried on in connection with other projects. Home economics projects include an electrical cooking study and iron in human nutrition. An investigation of the cooking quality of Maine potatoes is to be undertaken. An economic study of the local market conditions and requirements in Aroostook county prices of farm products and price trends, an economic study of the dairy industry, and a study of apple marketing are in progress, with a study of the Maine potato industry contemplated.

Farms Now Are Too Cheap

(*From page* 30)

that land prices at the peak of the boom were 50 per cent water.

Noting the money decline in farm land values since 1920 tells only part of the story. As everybody knows, the dollar is worth considerably less today than it was before the war. Economists have to allow for this fact in all their calculations. They take account of it in reckoning up the real value of the working man's wages, which depends not merely on the sum he gets but on what that sum will buy. It is the same with farm land values. Before we can tell what farms are actually worth now as compared with what they were worth 15 years ago, we must make allowance for the decline that has taken place in the value of the dollar.

When this is done, the Department of Agriculture tells us, farm values for the United States as of March 1, 1921, figured out at 20 per cent lower than the average valuation in 1914. In other words, an acre of land sold

now will on the average bring a price capable of buying only 80 per cent as much food, clothing, shelter, automobiles, or anything you like, as the price obtainable for that piece of land would have purchased before the war.

Here is our starting point in trying to determine whether or not farm values have been forced down too low. What other important economic factor exists whose exchange value is 20 per cent less now than it was before the war? Certainly not labor. Real wages, that is to say the purchasing power of the wage earners' income, are considerably higher now than they were from 1910 to 1914. Certainly not manufactured goods. Not even farm commodities. In April the purchasing power of a unit of farm products in exchange for goods bought by farmers at retail was only 11 per cent below the pre-war average, compared with 20 per cent below in the case of farm land values.

Efficiency Increases

Figure it any way you like, farm valuations have undergone heavier punishment than other values in the post-war readjustment process. Some people argue that this punishment was due. They hold that the overboosting of values that took place from 1916 to 1920 necessitated correction. Correction, yes, but not overcorrection. Overcorrection is a disastrous mistake; and that is what we are experiencing. Farm land values normally reflect current earnings plus an allowance for future increases in earnings. If unfavorable sentiment alters this relationship, trouble ensues.

In reality farm land today is worth what it can earn plus an allowance for possible gain in its earning power just as it was before the slump. It is not valued on that basis however. That is evident from the fact that net farm incomes, averaged for the country as a whole, have risen pretty steadily since 1922 without producing any corresponding favorable change in farm land prices.

Farm operators, according to the Department of Agriculture, averaged a return on their capital plus a reward for management of about 2.3 per cent less than nothing in 1921-22. In other words, they suffered a loss in that year. In 1922-23, however, they had a favorable balance of 1.2 per cent, which rose to 1.6 per cent in 1923-24, to 3.2 per cent in 1924-25, and to 4.3 per cent in 1925-26. In 1926-27 a setback occurred, which caused the average net return to drop to 2.9 per cent, from which it rose to 3.4 per cent in 1927-28. If these averages look small—and undoubtedly they are small—it must be remembered that they include the returns of the inefficient as well as those of the efficient farmers.

Normally a steady increase in earnings is followed by a corresponding recovery in the farm realty market. Moreover, the farm realty market makes some allowance for expected increases in earnings. This expectation, all pessimistic views to the contrary notwithstanding, is just now very substantial. Farm efficiency has increased greatly in the last few years with a corresponding fall in costs of production. As soon as difficulties in the adjustment of output to markets are measurably overcome, the post-war gain in efficiency will be registered in increased earnings. The increased potential earning power is there. It will become actual current earning power with every forward stride in the solution of the surplus problem.

In the 5-year period 1922-1926 American agriculture increased its output nearly 14 per cent over the preceding 5-year period. This was not done by increasing the area in cultivation, the means by which increased production was most commonly obtained in former times. It was accomplished notwithstanding a decrease in the crop area and a heavy decrease in the number of persons engaged in farming. In other words, it was the result of increased efficiency. It is estimated that the decade 1913 to

1923 showed a decrease of 17 per cent in costs per unit of output in American agriculture. Further progress has been made since 1923, as the above quoted figures show.

Earnings Should Increase

In the usual course, a decline in farm costs of production means at least a proportionate, and sometimes a greater, increase in farm earnings. This has not been the case since the war chiefly because the surplus problem has remained vexatious. Though increased efficiency has reduced costs, it has also enlarged the volume of production, with the result that prices have been held down. In time, however, this difficulty will be measurably overcome, production will be adjusted with more nicety to consumers' requirements, and the benefits of increasing farm efficiency will stay with the producers. That favorable situation, if the basic forces that have determined land values heretofore remain unchanged, will be reflected in a rising farm realty market.

In short the agricultural position is stronger than it appears on the surface. Wider public appreciation of its essential strength is urgently necessary. Such appreciation, besides smoothing the path of farm debtors, would create opportunities for competent farmers who have been separated from their land to re-enter farming on conditions looking to their re-establishment as landowners. The credit agencies that are holding "distress" land dislike parting with it at present prices. And who shall blame them? They know that present prices do not reflect real values. They might be glad to let some land move, however, were a demand for it to arise among farm operators.

Lack of funds among farm operators is not as important a factor in the prevailing quietness of the farm realty market as one might imagine. Greater importance attaches to their skepticism as to basic values. A preference for renting as against buying land under present conditions is very wide-spread. Sometimes, of course, it is better to rent than to buy. That is the case on inflated realty markets, when farm valuations discount the future too heavily. But the present market is a deflated one. In all probability the balance of advantage as between renting and buying most often lies with buying. Only the farm operators don't see it. If they did, a farmers' market for farm lands would spring up, because holding agencies are offering exceptionally easy terms.

The Outlook

In a letter to the writer the president of a leading Iowa bank expresses a strong preference for getting distress land back into the hands of owner-operators. He recognizes that certain elements in the situation favor experiments with various forms of large-scale farming, but believes the best results in the long run will continue to come from the family-sized, owner-operated farm. Accordingly this banker thinks letting farm operators in on the ground floor will be justified if they can farm in the manner required by modern conditions.

Obstacles to this program would vanish under the stimulus of a more realistic estimate of farm prospects. With sellers and buyers equally informed that better times are in store, working capital as well as funds to finance land purchases would be available to competent and industrious men. It is safe to predict that the curve of farm realty values will shortly turn upward, if it has not already done so. In the year ended March 1, 1929, the trend for the country as a whole showed a decline of 1 per cent. That is a trifling drop compared with the declines registered in 1922, 1923, 1924, 1925, and 1926. It looks like heralding the turn of the tide. Special significance attaches to the fact that the declines last year were not below the national average even in states that experienced very sharp drops in the immediately preceding years. The

time is about ripe for some new and bold agricultural financing.

Just how this will be done will depend materially on whether corporation farming on a large scale turns out to be practicable. In that case, much distress land now held by financial agencies will not be thrown back upon the market, but will be farmed by hired labor or by tenants under central supervision, or perhaps by agricultural corporations. Competent observers, however, are not yet convinced that this will work out. It is difficult to standardize agriculture, particularly where crops are much diversified; and yet large-scale production seems impossible without standardization. Heretofore the intelligent judgment of the financially interested operator has usually been necessary to success in farming. Whether or not that can be dispensed with remains to be seen.

If it cannot be dispensed with, the alternative is to identify ownership with operation once more; in other words, to re-establish the working-farmer as the mainstay of the farm realty market. This necessitates, not sacrifice prices, but easy terms. Joint stock land banks and some other credit agencies are pioneering along this line. They have indicated a willingness to enter into long-time contracts with individuals for the purchase of land, and require simply that the intending buyers shall be men of character and agricultural experience.

Once land begins moving in this way, it will move fast; and the benefits of the change should be widely diffused. Holders of land will begin to draw revenue from properties now not producing anything like what they might, and farmers will acquire land on terms assuring them a profit on their undertakings. Action awaits wider perception of the fact that declining costs of production and better adjustment of production to markets are laying a foundation for increased agricultural earnings.

The Keystone Farm

(*From page 7*)

tion in 1927 yielded 51.5 bushels per acre, shelled corn, too, mind you."

The next field had grown rye and vetch. The shocks were thick and the bundles tall. Guesses were that they would thresh 20 bushels to the acre. (The field actually threshed more than 22 bushels.) Into this stubble a seeding of rye and vetch would be drilled to be turned under as a green manure crop before corn is planted next spring.

The alfalfa field was next in the tour. Yellowish snake-like lines where the drill that put on last spring's top-dressing of 200 pounds of muriate of potash per acre did not quite lap, again told the potash story. From the ground the letters were plain, but it was difficult to get the proper perspective on the two words which occupied a half acre of ground.

At the north end of the field were a set of plots to show what combination of phosphoric acid and potash grows best alfalfa on this sand. The plots started with 16 per cent superphosphate and on each plot, eight units more of potash were added. Each one had 525 pounds per acre. Every plot where potash was used showed alfalfa. The strips between were brown and sere; untreated they produced nothing but weeds and grass. The plot which received only the 525 pounds of 16 per cent superphosphate had no more alfalfa on it than there

Groups of people were guided over the farm to observe results of the rotation.

was on the untreated check plot on either side. A plot that seemed to be half green was where only half as much potash as phosporic acid was used. Three plots that appeared solid green were where as much or more potash as phosphoric acid was used. The straw-colored check plots bore mute testimony of the winter-killing which takes place on these sandy soils when no fertilizer is used.

Back to the barns, Mr. Hagerman showed with pride a nice herd of Guernseys headed by a bull with four daughters that make an average of 414 pounds of fat, a herd which would easily sell out for more than $2,000.

It is no wonder then that Dean Cox stood ready to congratulate the managers of this farm for the splendid work which they have done in demonstrating how this originally poor white sand, upon which only scrub oak would grow, can be brought back into profitable production. Nor is it any wonder that an invitation to the annual sandy land farmers' field day on the Keystone farm calls forth from considerable distances a big attendance of farmers who have sandy land problems.

Potato Soils

(*From page* 22)

fruit production during the final stages of growth. Phosphoric acid in the fertilizer is essential to profitable returns, more especially if manure is available (manure having a low content of phosphoric acid in comparison with nitrogen and potash). Phosphoric acid serves to counteract the influence of an excess of nitrogen which may occur from too liberal applications of manure or unbalanced fertilizers. Under such conditions phosphoric acid tends to insure more favorable conditions in promoting the growth of healthy plants. It is helpful especially in a cold and wet season in hastening maturity.

Potassium, like nitrogen and phosphorus, is an essential plant food element. One of the most important functions potash exercises is closely connected with the formation and movement of starch, sugar, and similar compounds in plants. Such crops as potatoes, sweet potatoes, sugar beets, and other root crops are generally responsive to applications of potash salts and their quality favorably influenced by such treatment.

Potash exercises a stabilizing influence in cases where there is an excess of available nitrogen. Plants liberally supplied with available potash are thought to be less susceptible to

plant diseases or fungus attacks. Tubers grown with plenty of available potash are said to possess generally a better cooking and keeping quality than those grown with fertilizers containing no potash.

The potato appreciates liberal applications of available plant food and generally responds best to all three of the major plant food constituents found in complete fertilizers. The kind and amount of fertlizer to apply depend to a large extent on the soil type, whether manure is available, and whether a leguminous or non-leguminous crop is to be plowed down.

The nitrogen in potato fertilizers may be derived largely from inorganic sources, particularly if a sod or cover crop is plowed under and manure used. The sod or cover crop and the manure supply slowly available nitrogen in organic form, much cheaper than cottonseed meal, dried blood, tankage, or fish scrap. Owing to the high cost of the latter materials, only enough should be included in the fertilizer to insure a good physical condition. If practicable to use other materials for this purpose the high-priced organic materials can be left out altogether.[1] Good physical condition of the fertilizer mixture means uniform application, as a result of which every potato plant gets its proportionate share of plant food. Where a heavy sod, top-dressed with manure, is plowed under, the percentage of nitrogen can ordinarily be reduced somewhat; if not much manure is available and the sod is comparatively light, more nitrogen in the fertilizer will be desirable.

Phosphoric acid is customarily derived from superphosphate. Results of experimental work suggest that a range of from 6 to 10 per cent of this constituent in the fertilizer is about right. Where there is plenty of manure, the larger rate is desirable.

Results in general show that potash is very essential for potato production, from 4 to 8 per cent giving the best results. The percentage of potash will vary somewhat with the type of soil. Sandy soils ordinarily will respond to larger applications of potash than heavy soils.

Field work generally tends to show that the muriate gives as good yields as the sulphate, without measurably affecting the quality of the tubers. As the muriate is considerably cheaper, the potato grower should benefit from its use in potato fertilizers. With respect to the rate of application of fertilizer, there will be some variation from one soil type to another. Sometimes 1,000 pounds or less, where plenty of manure in available and a heavy sod turned under, make an economical rate of application; sometimes a ton and over to the acre proves profitable.

Finally, the ratio of the plant food constituents, nitrogen, phosphoric acid, and potash, to one another, is important. No one ratio, it will be conceded, will fit all soils. The ratios approximating 1-2-1 to 1-2-2 come close to northern potato soil requirements. In the South the proportion of nitrogen, phosphoric acid, and potash lie within narrower ranges, more like 1-1-1, or 1-1-.75.

The tendency in the northern sections is to put about twice as much phosphoric acid as nitrogen in the mixture and the percentage of potash practically falls between the nitrogen and phosphoric acid. Thus we have 4-8-6, 4-8-7, and 5-8-7 mixtures. In the South 7-6-5, 7-7-4, and similar analyses are employed, thus catering to the requirements of the early crop. The late crop in the South is apt to receive a higher proportion of phosphoric acid.

In some potato growing sections, where manure is available and a sod is plowed under, the ratio in the past has been close to a 1-4-4, or 1-4-5.

[1] This statement is made primarily with reference to potato soil types of the late or main crop potato belt. The relative value of inorganic and organic nitrogen under southern soil conditions constitutes a separate study which is now under way.

The latter represents the familiar 2-8-10. It is doubtful whether as much as 10 per cent of potash is required. Certainly a higher proportion of nitrogen should be used. Results obtained indicate that 4-8-6 or 4-8-7 analyses are nearer the mark year in and year out.

Use High Analyses

The use of low analysis fertilizers for potatoes is pretty much a thing of the past. Already potato growers have sensed the value of both high analysis and concentrated fertilizers. They save time and labor. Work conducted by the Experiment Stations and the United States Department of Agriculture has definitely shown the economic and crop producing value of high analysis fertilizers. Considering the fact that in many potato growing regions it is not uncommon to use 1,500 to 2,000 pounds of fertilizers to the acre, that freight has to be paid, the bags handled, hauled and distributed, makes it essential to increase the plant food and correspondingly lower the quantity of fertilizer to be handled in the field.

With respect to concentrated fertilizers containing two, three, and sometimes practically four times as much plant food as ordinary high analysis fertilizers, present indications are that such mixtures, particularly those containing twice as much plant food as ordinary strength fertilizers, are going to prove very satisfactory for potatoes, especially in sections where the soil has a relatively high water-holding capacity and serious droughty periods are rarely experienced.

A concentration which permits the grower to apply, for example, 1,000 pounds of fertilizer to the acre instead of 2,000, or just one-half as much, but no less plant food, is an important factor in the cost of production of potatoes.

When it comes to using treble or quadruple strength fertilizers we have a different story because these plant food concentrations mean less and less conditioning material. Otherwise it would be impossible to get the concentration desired. In order, therefore, to get the plant food in the mixture boiled down, as it were, to where there is a minimum of inactive ingredients, it becomes necessary to use in the mixtures highly concentrated carriers of nitrogen, phosphoric acid, and potash.

No trouble has been experienced with the potash or phosphate salts employed in the production of concentrated fertilizers. The nitrogen carriers cause more trouble because some

Comparing the yield of fertilized and unfertilized potatoes. Note also the difference in vine growth.

of them absorb moisture readily from the atmosphere. This is particularly true of the most concentrated, but even here chemical engineering ingenuity is expected to improve matters to the extent that even treble and quadruple-strength fertilizers will become safe to use under different soil conditions.

It is not inconceivable that with certain highly specialized vegetable crops grown on high-priced land near cities overhead fertilizing may some day be a common practice. By dissolving soluble salts in elevated storage tanks, or utilizing a pressure system, the crops could be supplied with nutrient solutions at any time desired. Ordinary watering could follow in order to wash the salt solutions from the foliage into the soil. Where we can now apply water to such crops at any time, it may prove just as practicable to feed them at any time.

Fall Application of Potash

(*From page 26*)

spring, and after cutting with 500 pounds of muriate of potash per acre. Last fall he left off the 500-pound application of muriate of potash and applied instead 1,000 pounds of 5-8-5. He was dissatisfied with the results, and this year has gone back to the muriate of potash. While he cut as much grass as a result of the application of 1,000 pounds of a 5-8-5, it was not as big nor of as good quality as resulted from the application of straight potash.

Asked for his reason for applying fertilizer after cutting, Mr. Rode explained that he had learned full well that the asparagus to be good in the spring depends upon a strong, vigorous growth of tops after cutting, which in turn stores up in the roots' energy to produce quality shoots the next spring. Applications of ample nitrogen and potash encourage such vigorous top growth. The 12 acres of asparagus this year yielded 2,200 crates of good-sized stalks; approximately 1¼ tons per acre yield.

The alfalfa is grown on the farm simply to build up the land. Hay for six or seven head of cattle is harvested and the rest of the yield is plowed under.

Mr. Rode uses between 600 and 700 pounds of a 5-8-5 on his tomatoes, thereby applying more potash and less nitrogen than some of the growers in his section, because he has found it more profitable to grow vines from which he can pick tomatoes throughout the whole season rather than two or three weeks.

Accused of being a potash enthusiast, Mr. Rode exclaimed, "Yes, sir, if it wasn't for potash, I wouldn't be here, simply because I wouldn't be farming. I was born and brought up on a farm and I like it, but I wouldn't be farming if I couldn't make money."

"We learned during the war when we couldn't get potash, that we couldn't grow sweet potatoes. All we could grow were a few 'shoe-strings.' There were no marketable chunks of the types which I have just brought in. There is a difference in price right now on sweet potatoes of $1.25 a basket; primes are selling today for $2.25, and mediums for $1.00. Potash makes the difference. Potash also makes potatoes which I can dig and get on the market early in order to get advantage of early high prices. For me, potash doubles the value of my crop."

Picturesque Brittany

(*From page* 44)

barren and wild." For centuries Brittany, because of her natural position, was more or less isolated, but in the nineteenth century the development of railways and other means of communication "drew Brittany from its isolation." In the nineteenth century also, agriculture "developed in a remarkable manner" which development has continued to the present day, all the more remarkable when the natural conditions are borne in mind.

The total area of farm land (cultivable area including land being farmed and prairies) in the four departments of Cotes-du-Nord, Finistere, Ille-et-Vilaine, and Morbihan is about five million acres, or about one and a half million acres more than our potato acreage. The farms are mostly small, for the Bretons are a thrifty and hard-working people. For instance, in the Department of Cotes-du-Nord there are 42,910 farms of from 3 to 25 acres and 14,998 farms of from 25 to 100 acres. In Finistere there are 52,000 farms of 25 to 100 acres. Characteristic of the small farms are single fields divided into several strips, of a few rods in width, wheat possibly being grown on one strip, then other strips of other crops such as buckwheat, oats, potatoes, hay, or possibly a truck crop. Cattle are tethered. Unique in parts of Brittany are the fields divided by fences of earth on which ferns to be used for bedding often are grown.

The chief crops of Brittany are wheat, rye, barley, buckwheat, oats, potatoes, beets, cabbage, and other truck crops, clover, alfalfa, and flax. Some of these crops are confined to two or three of the departments. Fields of buckwheat are common and typical of the landscape. By far the most important crop is wheat. Apple orchards are also common in some parts, as a result cider, and not wine as in other parts of France, is the drink of the countryside.

In increasing the yields of crops, fertilizers are coming into more and more popular usage, either purchased through local merchants or through thriving cooperatives, some of such cooperatives having as many as 30,000 to 35,000 farmer members, while there are also hundreds of local merchants who sell fertilizers and fertilizer materials in every town and village.

While mixed fertilizers are used, the much more common system is to buy fertilizer materials and apply such according to the needs of the soil and crop. Such materials available to the farmer in every village include several forms of nitrogen, superphosphate and rock phosphates, while the sources of potash are cheifly high-grade sylvinite and muriate of potash, but particularly the former. The amounts of fertilizer used have increased in recent years, the tendency being to balance up the phosphoric acid with more nitrogen and especially with much larger amounts of potash salts. The consumption of these salts in the two provinces of Cotes-du-Nord and Morbihan has doubled in the last two years, and in the other two departments has increased in the same period from 50 to 60 per cent. Thus, by the careful buying and careful use of fertilizers, the present-day Breton farmer is carrying on the fruitful development of his agriculture, started long ago by his Celtic forefathers.

As a basis for the use of fertilizers, the care of the farmyard manure is not overlooked. In fact this is considered most important. For instance, a photograph shows a manure pile on a cement bottom, underneath which is a pit for the liquid manure.

Brittany also has a breed of dairy cows all its own. It is called the "Black Piebald." They are a small type. The weight is given as generally

An old lady sitting on the stone bench in front of her home in Locronon.

less than 300 kilos (661 lbs.). But though of small size, the breed is very thrifty and hardy and has remarkable qualities for the production of milk and butter. The breed is located chiefly in the departments of Finistere and Morbihan.

In selling his produce, the farmer often uses the local markets which are found in most of the towns and villages. One or two of the photographs show typical market scenes. One last picture that made a strong impression is the picture shown at the left of a dear old Breton lady in her lace cap and black dress, sitting one Sunday afternoon on the ancient stone seat outside her house in the old village of Locronon—a lady happy in the dignity of honest toil and serene in the faith of her fathers—a simple, humble picture, but a picture not without a gentle charm and to many possibly not without a suggestive power in the art of living.

Such, so it seems to me, is Brittany.

Education

(*From page* 4)

dren have inherited some of the native discernment and discrimination that have made us shrewd enough to attempt this exploitation of the schoolroom. If they were no smarter than we were in adolescent days, I would entertain grave fears about it. But the most of them stick to the educational circus in the main tent and forget the freaks in the side-shows.

In furbishing up our educational system in America, do we fall into the error of so many country merchants who put all the nice goods in the show window and disappoint the customer who inspects the back shelves? Some English teachers touring my state recently exclaimed with admiration over our wealthy colleges and state schools and our city palaces of athletics. They marveled at the money we lavished for experiments in education and the sums generously given by taxpayers for research and propaganda. But nobody took them for an auto ride out in the sticks a dozen miles from the State University where the three R's are still taught in a shack that resembles the joint where Henry Ford made his first mistake.

Just a few kids each year come in from the country to high schools or colleges supported by public expense and located on some concrete highway

where everybody admires them. As soon as they arrive people are solicitous for their health and educational welfare, but in many cases their "horse" sense was stolen and their health destroyed before we locked the barn door. We speak and write in flamboyant platitudes about the stocks of virile youth who bring from the soil the future stability of the nation. Yet none of us would expect to raise a crop of good seed ears on neglected land by injecting vitamins when the stalks are knee high.

This happens largely because the teachers in the finishing schools are better organized than the young kids in knee skirts who are expected to mind incorrigible youngsters for mother and prepare adolescents for high school at the same time. The only spokesman for the girl instructors in the bush league are the state supervisors, and they are usually tongue-tied or politically ham-strung. My state needs a strong organization of common school teachers to stand up for the rights of the submerged majority.

Has the halo around the teacher's brow become dim in these garish days? Our common schools have passed from the era of slates, fist fights, and men tutors to the age of paper, petty pranks, and petticoats. In many of our elementary schools the boys never meet a masculine preceptor until they leave the grammar grades, and then the ones they meet are often "old maids." This process tends to provide us with an excess of fresh bullies and simpering sissies among the boys, while the girls discover long before they should that the world is run by women.

Your Hoosier Schoolmaster type was no uncommon man in the times when your father and mine snatched brief glimpses of literature and logic from McGuffey's reader and Webster's speller. When I hear some of our educational bombasts making light of those men and their methods it sounds like the ridge-pole scoffing at the corner-stone. Those brawny zealots of the birch rod were the first servants of the public system of education and it wasn't their fault if muscle was often a greater necessity then mentality.

Perforce in those days the wilderness school might have borne above its door the verse from Chapter 9 of the Proverbs of Solomon the Wise: "Whoso is simple let him turn in hither," and again in another place: "Stripes are prepared for the back of fools." Yet continuing to search the scriptures for apt references, we might well post at the entrances of some of our institutions of higher taxes and higher learning the ancient Hebrew legend: "Though thou shouldst mix a fool in a mortar with wheat with a pestle yet not will his foolishness depart from him." We lack sorting and eliminating methods in our common schools and so we pack our big institutions with chaff and tares. Let's invent a recleaner attachment for our scholastic separator!

EMERGING from the tall corn of Iowa each year, 200 farm boys and girls hasten to cities from every county in the state, there to complete their "education" amid the hard knocks of city life. Secretary Hyde estimates that if the education of these youngsters averages $500 apiece to their parents, the farmers are contributing $100,000 per county every year for material with which the city welfare is built. Out of this realization comes the thought that cities must contribute out of their concentrated wealth to help carry the burden of rural school support.

Equalization laws that are based on the newer idea that education is a broad state duty, instead of a local issue, have been passed in some of the advanced states, to relieve the handicaps surrounding the lives of hundreds of bright children stifled under a system of school mismanagement that is a disgrace to rural America.

I am sorry to acknowledge that the worst opposition to greater state aid and direction often comes from the country districts. Our district school units are boastful of their independent democracies, jealous of their petty privileges, and anxious to hire and fire teachers on the same old narrow neighborhood prejudice that survives the dunce-cap days.

Education should be compulsory in attendance and regularity but never compulsory in tone and character. I am not thoroughly sold on some of this hue and cry about keeping all our bright children in the country. Some of our best friends in the cities are men and women whose early farm training and sympathy puts them in strategic places to give moral support to farmers when the crisis comes. I would as soon pass laws to bar the marriage of people of German descent with folks of Yankee or Norwegian ancestry as to erect legal barriers or monkey with social interchange between country and city.

In some of our earnest agricultural high schools the directors feel somewhat concerned when they cannot point to 100 per cent enrollment of country youth in the agricultural courses and field projects. I do not believe the agricultural teacher's job is to multiply the number of inefficient or half-hearted farmers by any process of cramming or sugar-treating the courses. Mental irrigation schemes are as unwholesome as wholesale land reclamation. It is just as satisfying in the end to keep two misfits away from a good farm as it is to save one crackerjack agriculturist from making a metropolitan blunder. Is it not wiser to teach one capable man how to do three men's farm work with modern equipment than to insist on the entire quartet going afield with hoes?

America's slogan is "freedom and equality." Let's have freedom of choosing an education and equality in the chance to get it. That's about all the doctrine we need, and he who brings in too many blue prints and too many kegs of nails for erecting the platform is only confusing the issue.

I HAVE never believed that you could educate an unwilling boy to be a farmer—I mean the kind of farmer who could keep cents, and sense. Laboratories won't do it alone, projects won't accomplish it either, and poetry is a dismal failure to a man who thinks great things in prose. We must keep the machinery oiled and in repair, of course, but let's not bust the gears and spoil the sprockets by feeding in the wrong kind of raw material.

In this way education is worse than the tariff, which some wiseacres say is a local issue. This means that too many overhead, cut-to-fit systems of supervision are an abomination to those who are closest to the problem.

Liberal education and vocational or practical "do it" education have been at loggerheads among the supposed shapers of American theory for some time. Originally the term "liberal" education meant the training of a gentleman and scholar, and even Aristotle said that a liberal education was not for workers in either manual arts or trade, because the one debases the body and the other debases the mind.

Our earliest private academies in America were usually for the privileged classes, and not until Andrew Jackson and the illiterate politicians of his day got in the saddle did we begin to open up the avenues of "book larnin'" to the common classes. Today the mob movement for universal culture as far as it can be secured in our factory system of education is at the zenith.

Materially, we have indeed gained tremendously by the advance in education. At least we have learned to *want* more of the dressy and classy things of life and have sped up the machinery for making them. But

Horace Mann, who dreamed of a liberal education as the salve of all our mental deficiencies, and who thought that its universal application would give us a veneer of culture—well, his philosophy has somehow struck a snag.

I am sure that the librarians will tell you that the essays of Montaigne, Plato, Bacon, and Drummond are just about as dusty and have as many uncut leaves as they did a generation ago. Quantity production, found so good for material things, has been taken over into the cultural and mental avenues, and so we find that what the tired man wants in his hours of ease just about controls the level of our culture. I know, of course, that you are personally an exception to the rule, or you wouldn't be reading this. Somehow or other the opening up of the liberal education feed bag hasn't done what Horace hoped.

OUR modern education has centered on trying to fit men and women to meet emergencies with dash and surface skill rather than by any process of deep thought or liberal learning. We are educated to keep busy rather than educated to be happy when alone. So the modern householder, left by himself at vacation time, reads his tabloid thriller and then goes to the movies.

When I meet a man who can splice rope, plow furrows, and quote Shakespeare I invariably find him one of the fortunate chaps who has never had much modern schooling.

We often hear somebody derided because he has no opinions. Ignorance is opinionated. Educated folks think differently than ignorant folks and usually refuse to settle down on china nest egg opinions hoping they will hatch into achievement. Don't worry because you cannot follow the ruthless and enthusiastic mob after somebody with a mission and a freak opinion. He who has no doubts is not really educated.

Specialized education that shuts out all that is foreign to its field is almost as bad as being blind. We are "folks" first of all, and then bankers, lawyers, dentists, and farmers afterwards. The old wheeze, "What are you going to be when you grow up, sonny?" has been responsible for man's missing more fun than the Volstead act. We need more education for life's enjoyment than for mere money-making.

Education begins when you toddle and ends when you totter. They talk much about "adult education" in a formal way, as though it were something newly discovered. Moses learned more about the cussedness of human nature on Mt. Sinai than he knew in the bull-rushes. Even Thomas Edison is learning something from those youthful contestants of his. In fact, real education seldom begins until you are beyond the reach of normal teachers. It is not for nothing that they call graduation "commencement." The best form of education we get is by contact with other folks in the work-a-day world. Whether it is by cooperation or by competition, one learns vastly more in a month rubbing elbows with the human equation than in a year of mathematics.

THIS month the kiddies settle down in their studies after a season of sunburn. If they go slowly in their work or seem to lack intelligence, don't blame it all on the teacher without investigation. If they march home with Grade A report cards it isn't entirely safe to bank on ancestry either. Probably the chief credit belongs to the school.

Finally this is the season when adult education will count for much, if you would save your reputation within the family circle. The best use of adult education I know is for a parent to be able to answer "posers" without betraying his ignorance. To flunk in such an examination is far worse than a con in the days of our youth.

THE BEST SHORT STORY OF THE MONTH

The tourist guide was getting tired. He had to answer too many dumb questions. "And just where did you say this rock came from?" inquired another wahoo. The guide politely replied that a glacier brought it down. Then up spoke the inquisitive one again: "And where did the glacier go?"

"Aw," said the guide, "it went back after another rock."

Mrs. Bloop: Does your car have a worm drive?

Mrs. Bleep: Yes, but I tell him where to drive.

Small Boy (on arrival at country cottage): Mummy, where is the bathroom?

Mother: There isn't any bathroom, dear.

Small Boy: Good! This is going to be a real holiday.—*Typo Graphic.*

"Your wife is talking of going to France this summer. Have you any objections?"

"No, certainly not. Let her talk."—*Wall Street Journal.*

The little girl had been visiting. When it was time for her to be going home, her hostess said: "Goodbye, Marjorie; you must come again soon. We should like to see more of you."

"But there isn't any more of me," replied Marjorie.

Mrs. Henpeck: "Everything is getting higher."

Mr. Henpeck (meekly): "Oh, I don't know, Maria. For instance, there's your opinion of me, and my opinion of you, and the neighbors' opinion of both of us."—*Tit-Bits (London).*

Abie: "Paper, vat is science?"

Abie's Papa: "My, how could you be so dumb! Science is does tings vat says, 'No Smoking.'"

The scholarly appearing little man rushed into the police station. "I wish to report," he gasped, "that my car has just been stolen!"

"See who did it?" queried the desk sergeant.

"Ye-yes."

"What'd he look like?"

"I fear I could not describe him accurately," replied the little man. "But" (and he brightened up and produced a note book from his pocket) "I succeeded in taking the number of the car."

Irate Father: "What is that stuff on my new car? Where have you been?"

Calm Son: "That's only traffic jam."—*Tit-Bits (London).*

She: "Is it dangerous to drive with one hand?"

He: "You bet. More than one fellow has run into a church doing it."—*Cornell Widow.*

Recent Reports Prove Effectiveness of CERESAN In Controlling Smuts

ALTHOUGH Ceresan has been commercially available only since last spring, encouraging results from its use are already coming in from the field.

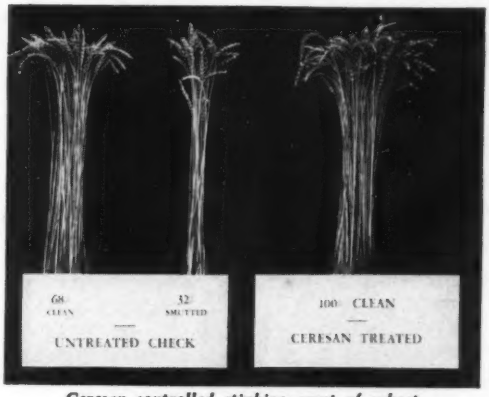
County Agent R. R. McFadden, in the Farm Bureau News of Harvey County, Kansas, June, 1929, reports: "Results from oat seed treatment tests conducted by Fred Grove of Emma township indicate that the old wet method of treating oats to prevent smut will probably be replaced by a dry dust method. The product used in this test was Ceresan, manufactured by the Bayer-Semesan Company of New York.

"By actual count it was found that in the untreated plots were 18% smut and the treated plot had but a very small trace of smut, a great deal less than one-half of one per cent.

"Altho counts were not made to determine the per cent of stand secured, it appeared that the stand in the treated plot was slightly better than the untreated. In the next few weeks comparative yields will be determined on these plots and the results published."

In the Pratt Daily Tribune of June 15th, Pratt County, Kansas, we find an article on the Field Day Trip conducted by County Agent F. L. Timmons which reads:

"The oat . . . plots on the Wing farm showed some striking comparisons. The untreated plot of Kanota oats showed a smut infestation of 8¼ per cent while the treated plot which was given the dry Ceresan seed treatment showed no smut infection."



Ceresan controlled stinking smut of wheat in this severe test

Advantages of Ceresan

Ceresan is effective in controlling bunt or stinking smut and seed-borne flag smut of wheat; seed-borne stem smut of rye; loose and covered smuts of oats; stripe disease of barley; covered smut of barley; kernel smuts of sorghums and millet; and seedling blight caused by seed-borne scab.

Progressive wheat farmers use Ceresan because it is convenient to handle, does not clog drills nor cause breakage of parts and can be easily and quickly applied. Seed wheat may be treated in spare time and stored without injury. Ceresan does not slow up the rate of drop and seed treated with it may be safely planted in either dry or moist soil. Any Ceresan left over may be used by the farmer next year on spring sown small grains.

Samples Furnished

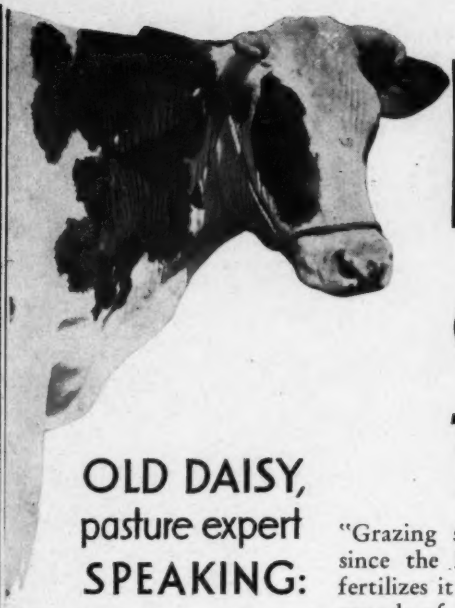
Plan your seed grain treatment projects now. We will furnish gratis samples of Ceresan to those Cooperative Agricultural Extension and Vocational Agricultural Workers who will plant demonstration plots of treated and untreated checks and report to us the results of disease control and yield increases. Send a list of crops to be treated with request for samples and descriptive literature to Bayer-Semesan Company, Inc., 105 Hudson Street, New York, N. Y.

DUBAY

CERESAN

REG. U. S. PAT. OFF.

Dust Disinfectant for Seed Grains



If cows could TALK—

OLD DAISY, pasture expert SPEAKING:

"Grazing sure is better on our farm since the Boss limes our pasture and fertilizes it every four years with 1,000 pounds of 0-10-10 per acre. We save our energy to make milk now that we only have to work a couple of hours to fill up on luscious, succulent, green feed.

"Before our pasture was fertilized we spent all day and half the night searching for a little good grass. We had to be fed in the barn to keep us producing milk. The Boss got tired of most of his milk check going for feeds and decided to try fertilizing an acre of pasture for each cow.

"The lime, phosphorus, and potash brought back clovers and good grasses and crowded out the weeds. This treatment in the Fall and a nitrogen top-dressing in the Spring keeps our pasture in tip-top shape. No wonder we are contented cows."

Pasture improvement is a problem that is getting more important each year. Some very interesting literature on the subject for distribution among your farmer friends will be sent you free if you communicate with: Agricultural and Scientific Bureau, N. V. Potash Export My. (of Amsterdam, Holland), at 19 West 44th Street, New York City.

These three plots of a fertilizer test in a Maryland pasture show the value of the proper fertilizer treatment. The plot at left was fertilized with 1,000 pounds of 0-10-0 per acre. The center plot received 1,000 pounds of 0-10-0 and 1 ton of ground limestone per acre. The plot at right received 1,000 pounds of 0-10-10 and 1 ton of limestone per acre. Addition of potash resulted in a 10,000 pound increase in the amount of green weight produced per acre in three months' time.

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